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Original Contributions.

HISTORY AND ETIOLOGY OF DENTAL CARIES.

BY ROBERT R. GILLIS, D.D.S., HAMMOND, IND. *READ BEFORE THE NORTHERN INDIANA DENTAL SOCIETY, AT FORT WAYNE, SEPTEMBER 8-9, 1908.*

Under the history of dental caries we find that there never has been a race of men that has been immune from dental caries. The tombs of ancient Egypt show from the mummies unearthed that dental caries was known to them. The condition of the jaws and alveolar process in these mummies indicates that not only dental caries, but its sequence, alveolar abscess, were quite prevalent; and that the ancients suffered as we suffer cannot be doubted.

Vincenzo Guerini, of Madrid, has recently published a very exhaustive history of dentistry. In this he makes reference to many of the ancients, who were probably practitioners of dentistry. In one article I was able to get hold of, which appeared in *Cosmos* a few months back, he makes mention of the more modern of the ancients as appearing about 450 to 600 years B. C.

The Etruscans probably were most apt in the art of dentistry. We find that about 450 B. C. the Table of Laws of the Romans includes, in one paragraph, a reference to something in dentistry; this particular paragraph or law was concerning the burial of dead bodies; the law prohibited the burial of any dead body with any gold attached to it, but it made exception of gold wires in the mouth, which supported false teeth. So we suppose from this that the Romans of that date knew something of the practice of bridge work or crown work. A little later, then, coming up to the time of Christ, historians of the day, and also the novelists now, those who wrote the best works of that time, spoke every once in a while on something along the line of false teeth. Particularly, one

or two of the writers spoke of some of their leading characters as wearing false teeth.

One speaks of "her teeth being as white as pearls, but they are not her own;" another that the "teeth were like gown, she takes it off at night." When the Romans overcame the Etruscans, the Etruscans who were practicing dentistry went to Rome, and were the leaders in the dental art from that time on. Dr. Guerini, in examining articles in one of the museums of Rome, was handed one exhibit which was not publicly known because its identity had not been fully established. Upon close examination he found that it was two plates of gold soldered together with a wire ligature, and this had undoubtedly been a retaining appliance for some false teeth. We note that dentistry and medicine were not closely allied professions in these ancient times. There are several medical writers of that time who say nothing about dental practice.

Now as to the etiology of caries; it has been defined as the chemical disintegration of tooth elements. In that it is a chemical action we imply that it is a molecular action; and that is in exact accord with the recent theories.

In the paper just read (Dr. Salisbury's) the places of beginning and its progress were discussed, so I will not repeat that here.

Caries may be quite white and it may be quite black, and it may be any intermediate color due to different processes. A little later I will speak of that part of the question. I could not think of any better way to discuss the different theories as to the cause of caries than to arrange them in order as they have been presented from time to time for the adoption of the profession. Beginning about 1754-56, Boudett advanced the theory of inflammation. He and many of the writers following considered that caries began inside the tooth. Some inflammation was begun, which lowered the vital resistance in the tooth, and decomposition resulted from this the same as it would if some irritant were applied to a bone, producing osteitis and necrosis. In 1778, John Hunter wrote a treatise on caries in which he elaborated upon the inflammatory theory, and although he accepts that theory, still he does it rather reluctantly. Here we have just a beginning of the breaking away from the inflammatory theory.

In 1806, another writer puts forth the belief that the inflamma-

tion originates within the pulp, within the soft tissues, and then spreads through the more solid portions to the surface.

In 1829, another writer comes just one step nearer to the real cause by declaring that the inflammation is originally seen in the superficial portion of the dentin, that portion just underlying the enamel. All of these writers said that the inflammation and degenerative process was similar to that seen in the inflammation and necrosis of bone.

In 1830, Koecker made one more great step. Although he continues the theory of inflammation, he observes that caries never exposes the pulp without first appearing on the outside of the tooth. There he is coming one step nearer to the theory of the present day. In 1835, Robertson advanced the belief in some sort of a chemical destruction, some sort of an acid which decomposes the food lodged about the teeth. As our predecessors had better methods of investigating this condition, they came a little closer to the truth each time a new investigator announced his theories.

In 1838, Regnard, of France, upheld this theory that an acid causes decomposition, a decry against the inflammatory theory, and one of his strong arguments was the action of decay that had been observed on artificial teeth where the inflammation was impossible. In explanation of this the artificial of Regnard's time were not porcelain teeth, but those carved from ivory, or those which had been taken from other mouths. He observed that these teeth underwent the same decomposition processes as those naturally in the mouth; and, of course, where a tooth was in that condition there was no chance of any inflammation on the inside of it.

In 1850-59, John Tomes, who was one of the greatest microscopists of his day, discovered with the aid of his instruments that the dentin was composed of tubes. He also discovered that decay apparently began on the outside and worked inwardly, and as decay progressed toward the center of the tooth it approached or nearly the normal dentin. It was he who discovered the "transparent zone," the zone just preceding the action of the caries, which precedes the decomposed portion, and he was in error in believing that it was a wall of resistance thrown up against caries.

In fact, it is one of the first steps in the process by which

caries decomposes the tooth structure. He also advanced the theory that it is an external irritant, and that it is something which is sufficient to destroy the vitality and decompose structure.

In 1860, Bridgeman advanced the theory that it is an electric current causing this decomposition. He claimed that the crown was the positive electrode, and that when certain conditions were present an electric current was created which decomposed the enamel of the teeth. His idea illustrated the theory at that time that caries began on the outside.

Dr. Watt advanced the theory, a rather empirical theory, and one worked out by experiments, in which he tried to explain the different colors of decay. He claimed that the different colors were caused by three acids—nitric acid, sulphuric acid and hydrochloric acid. He claimed that the acids are generated in the mouth from the action of air and saliva upon the foodstuffs. The nitric acid produces the white decay, and this is generated from the nitrogenous food which we take into the mouth. The sulphuric acid produces black decay, and is generated from the sulphur which is always present with the albumen. The hydrochloric acid produces the intermediate colors, and is derived from the soluble chlorides which are taken into the mouth. This theory was not worked out by experiment and not much credence was placed in it.

Dr. Magitot, of Paris, advanced one more step and claimed that it is the organic acids and not the mineral acids which create the havoc. The action, according to his theory, would be general and not local. His theory was one stepping-stone which led to others thinking along the same line and later developed the present theories.

In 1867, Leber and Rottenstein discovered germs in the tubules of the teeth. So here we have the beginning of the germ theory. They called it leptothrix buccalis, but they did not cultivate these germs, and they simply called attention to them, and later we find that there are many germs at work. In 1883-85 the man we all love for what he has done, Dr. Miller, of Berlin, brought forth the "germ theory of decay." He worked for several years before he announced his results, but it was in 1883-85 he announced to the profession that he had found these germs in the teeth, and

that he had produced artificial decay exactly like that which appears in the mouth. We are all very well acquainted with this theory, and it is only a waste of time to discuss it. These are the exciting causes as developed up to this time, 1885.

Predisposing causes have been given in Dr. Salisbury's paper. Faulty tooth formation is one of the principal ones; fault in the structure of the tooth or in the shape of the tooth. If we have enamel fissures or occlusal fissures, or decayed patches on any of the surfaces of the teeth, it is the fault of the tooth formation or structure, and we sometimes find this when the enamel lobes fail to coalesce perfectly, giving malformation, because of the manner of the contact of the teeth. Heredity plays a wonderful role; constitutional conditions, such as pregnancy and the peculiar conditions which will develop in our saliva from time to time, will predispose to caries, and any prolonged illness which lowers our vital resistance will bring sorrow to the teeth as well as the other parts of the body.

In 1905 Miller called attention to the ptyalin theory, which had just been offered for the profession's consideration. These men thought caries was due to some action of the ptyalin of the saliva, but Dr. Miller shows very clearly that it is not that. Some secretions from the mucus glands created the trouble.

In 1905, Dr. Talbot brought out the idea that I suggested yesterday in discussing the paper on degeneracy. Possibly some who are here now were not here then, and I might repeat a part of it. According to Dr. Talbot, in the economy of growth the brain of man has been developed along a graded scale; and as man has risen through succeeding steps from the lower animals the brain has been developed at the expense of other organs, and particularly at the expense of the jaws and teeth. He cites us comparative anatomy. Beginning with the lower types of the animal kingdom, with the reptile, coming up through the various marsupials and up to the shark, the mammals, and up to man, we find that in all of these the snout and the jaws have been receding, consequently there is less room for teeth; fewer can appear. In some of the reptiles we find about seventy-two teeth, in man we find only thirty-two. At the time when man was developed to the stage where he had thirty-two teeth, he had his

most perfect dental organs. But brain development did not stop there, it has been going on continually, and as the brain has continued to develop the jaws have continued in a degenerative development; with the resultant smaller jaw fewer teeth can be accommodated, consequently we find some people who do not have third molars, and sometimes they are dropped from the anterior portion of the dental arch instead of from the posterior extremities. He sums up by saying: "Here then are the great underlying causes of tooth decay; namely, want of tooth resistance from within, disuse and tooth degeneration along the line of evolution and disease." In one of the last dental journals, Dr. Talbot again brings forth the idea that the condition termed *acidosis* and *indicanuria* are predisposing causes to caries, and according to him these same pathological conditions are some of the exciting causes of abrasion and erosion.

In this treatise he claims that whenever a man has family troubles, or a woman either, for that matter, business reverses, or too much business to take care of, his nerve force is vitiated, thus reducing his physiological resistance, his digestion fails him, his eliminative organs do not perform their work and acids are left in the body which should be eliminated, the blood becomes abnormally acid in reaction, the saliva is more than normally acid, all of the secretions of the body, external and internal, are slightly acid, and those acids affect such delicate organs as the pulp of the teeth. Here his theory assumes somewhat the character of those old theories of the irritation in the inside of the teeth, beginning at the pulp. From what I read in his article I take it that he believes there is sufficient acid there to begin the decalcification of the dentin from the inside. However, that would not result in caries directly. It is simply a predisposing cause. It makes the attack of caries from the outside much more successful and more rapidly destructive.

There is one other thing that has occurred to me just in the last few days. I heard a week ago, through one man who has a brother afflicted with tuberculosis, of a new cure for tuberculosis. Someone in Chicago has worked out a theory which is quite exceptional to the theories accepted by the medical profession of today. He claims that the tubercle bacillus is, in a way, not an

enemy of mankind, that it is equally a benefactor. When we live in cities, dusty, smoky places, we breathe into our lungs much solid substance which our faulty breathing does not expel again. Seventy-five per cent of the people do not use more than one-half of their normal lung power. The lower lobes of the lung are not oxygenated as they should be, and the solid particles breathed in settle in the lower lobes and become an irritation, and our faulty breathing does not expel them. The tubercle bacillus steps in and helps nature remove that debris, and if it were not for the tubercle bacilli our lungs would be completely stopped up, and we would die long before we had what now is called tuberculosis. Instead of administering drugs to kill the tubercle bacilli, we should administer treatment which will help them do their work, and his treatment is the administration of a serum. It seems to be doing the work. Last May he took seven patients from an institution in Cook County. A month ago the last of the seven patients had been discharged, being sufficiently rid of his tubercle bacilli that if he would take the proper pulmonary gymnastics every day he could recover and probably lead many years of useful life. Of course he does not claim that he restores the lung tissue which has been lost, but he claims that even if they have one-third of their natural quantity they ought to be able to get along, if we get along with one-half of our natural quantity. About three weeks ago one of them felt so well cured that he went and got married. Along the same line I want to say that dental caries is not detrimental to the human race, especially the dentists. If it were not for dental caries, probably all of us would be dead long before we are. I do not mean from that that we ought to let our teeth decay and pay no attention to them. But dental caries or the germ which causes decay have this function—they are placed there by nature to remove the food debris which lodges around our teeth before it putrefies.

Purification is a process of decomposition which should not take place in the body. Fermentation is a process which may take place and not be detrimental. It is not as bad as putrefaction. When we have putrefaction in the lower bowel it leads to lots of trouble. If we had all of this food debris in the mouth putrefying instead of being removed by caries, our system would be con-

stantly poisoned; many ptomains and other toxins, by-products of putrefaction, would kill us off in pretty short order, but the fact that caries and fermentation remove the food before it has the chance to putrefy prolongs our life. It is pretty well known that the only way to prevent caries is to keep the teeth clean. *Clean teeth never decay;* however, it is absolutely impossible to keep all of the teeth clean all the while.

PREVENTION AND TREATMENT OF DENTAL CARIES.

BY L. A. SALISBURY, D.D.S., CROWN POINT, IND. READ BEFORE THE NORTHERN INDIANA DENTAL SOCIETY, AT FORT WAYNE, SEPTEMBER 8-9, 1908.

Before going into the details of the subject given to me by your committee, in this symposium on Dental Caries, let me call your attention to the great advantage the dental profession of today have over the professional men of the past, due largely to such tireless investigators and delvers into the mysteries and possibilities of undiscovered dental science as Miller, Black, Kirk, Talbot and others.

They succeeded, after years of research work, in giving us absolute laws governing the etiology of decay, and subsequently the ways and means of prevention, beyond question of doubt; Miller the general prevention, and Black the systematic and sure forming of cavities and margins, so as to not only restrain decay, but absolutely prevent a recurrence under filling.

Caries of the teeth is, as I suppose you know, due to the action of lactic acid, the waste product of streptococcus media, on the calcium salts in the enamel, calcium lactate being formed, which is soluble in the fluids of the mouth. Since the streptococcus media, or call it caries fungus, is present at all times in the saliva, it would seem to the investigator that prompt and complete disintegration of the teeth would ensue, as a necessary and positive result of being constantly bathed in the infectious fluid, but, and here lies the crux of the whole matter, lactic acid to act on the enamel or dentin must be undiluted, and that implies its protection or isolation for a sufficient time to allow for the chemical action to take place.

This protection is bad in two ways, namely, in the natural or artificial imperfections of the teeth, such as pits, fissures, poor margins and the like, and to the tough elastic gelatinous plaques that are so often evident along the gingival line, and just gingivally of the contact point, where the food in process of mastication does not remove them. These areas are those of extreme susceptibility to decay; those of almost absolute immunity to beginning caries are the four axial angles, the smooth parts of the occlusal surfaces and that covered by healthy gum tissue.

I have endeavored to outline to you briefly where caries begins and why it commences at these points, and prevention of its beginning on this basis must be obvious to all; in short, cleanliness is the positive and absolute enemy to caries, its antidote; in fact, it is practically impossible for decay to exist in a territory surgically clean. If our patients kept their teeth in the condition they ought to, i. e., clean, our labor in this branch of dentistry would consist entirely of preparing and filling of cavities beginning in pits and fissures. However, we all know that they do not do this, either from ignorance, carelessness, laziness or what not, therefore, our duty is preeminently one of education, with the parents first, then with our younger patients, then going into the public schools, giving a thorough course of instruction in oral hygiene, prophylaxis and care of the teeth and soft tissues of the mouth and throat.

Right here I want to emphasize the importance of the school work. There is not a shadow of doubt, I am sure, in the mind of any man within sound of my voice, of the unquestioned necessity of thus diffusing dental instruction in our schools, both public and parochial.

From 80 to 90 per cent of the children of the civilized world are suffering from defective teeth. In cities where this school work has been given a thorough trial the results have been marked, an improvement in general health, less headache, earache and intestinal trouble.

I realize that educating the 18,000,000 school children of America to the necessity of oral hygiene and the care of the teeth is a hard one, but it can be done, and in every community there should be at least one professional man wise and dominant enough to be willing to give the time and energy it takes in order to

interest the various school boards and teachers, without whose support the work cannot be undertaken.

"On a single word," said Wendell Phillips, "has hung the destiny of nations," so take up this important matter, realizing that possibly before you are understood criticism will be directed toward you by some not broad enough to realize that no thought of personal gain has actuated you. Agitate the complete abolishment of the uncleanly public drinking cups, and the substitution in their place of the sanitary fountain, which is absolutely essential if you would prevent the spread of disease.

We are a rapidly growing people and the demand for first-class dental service cannot be taken care of properly with the number of professional men in practice at this time. Able men are needed in dentistry as well as in other lines.

I suspect you will agree with me when I say that all enamel and dentin are of the same relative degree of hardness. This being true it is up to the practicing dentist to so care for the teeth of his patients that recurrent caries shall be a bugbear of the past; also, through prophylactic treatment, to reduce all gingivitis and stomatitis to a minimum.

This prophylactic treatment must cover the absolute cleansing of every surface of every tooth, at regular intervals, at least every six months, although three months would be better.. Fillings that have moved away from gingival margins or not properly finished should be attended to and all cases of malocclusion corrected. All banded crowns should be discarded in favor of the sanitary bandless crown.

In the preparation of all cavities we have an imperative duty to perform, the mechanical or technical one of placing all cavity margins in areas of immunity; in other words, "extension for prevention." This done we have to make them smooth and both air and water tight; then with the filling that is indicated in each case inserted properly we have done our duty as best we can.

DISCUSSION.—*Dr. F. M. Bozer,* Logansport, Ind.: The paper well covers the subject, and the subject is an old one, and has been discussed pretty freely since I began the study or thought of dentistry, and I do not know that there has been so very much

new material added, except possibly in a very few instances a few writings.

We all have heard a great deal about the extension for prevention; of course, that includes the treatment. We have all, ever since we began the preparation of cavities, had instilled into us the disinfecting of cavities before attempting to fill. We have heard a great deal about the removing of every particle of decalcified dentin, although we hear oftener advocated to leave some of that decalcified dentin over the pulp of the tooth, as exposure would occur if it were all removed. I do not believe much in that theory. I believe that all such decalcified dentin should be removed, even though the pulp has to be exposed. Better to do this than to have an abscess resulting after the filling of the tooth. I believe in thorough removal, and, as I used to hear old Dr. George Cushing say, excavate beyond the zone of transparency, and even then we may find on thorough examination germs in dental tubuli which might be destroyed by the use of disinfectants and antidotes. I believe in thorough cavity preparation, and I also believe in the lining of cavities either with some resinous substance or cement. I have found in the past few years very beneficial in my own experience to use good cement in certain fillings in soft teeth, the result being something of an inlay when completed. I have found that to be very good, and I believe it will work out very satisfactorily and prevent a great deal of the return of decay which otherwise might occur in soft teeth, when the amalgam or even a gold filling had been inserted without the cement or the lining.

Outside of that one item I do not know that I have anything especially new to offer, any more than what I hear offered time and time again by those who are thorough operators. And on that phase of the paper that Dr. Salisbury prepared, I believe I have nothing further at this time to offer.

Dr. G. W. Cook, Chicago: I do not feel that I ought to be talking all the time just because I happen to be here, but in the reading of these papers, and in the discussion of the subject in general, I have made two or three notes. Of course, we all know the supposed etiology of dental caries, and we have been taught very systematically and in the majority of instances to remedy the

condition under which it has formed, after the cavities have appeared. Of course, they tell us if we keep the teeth clean we will never have any caries, but on the theory of the gentleman from Hammond if we kept the teeth clean we would die very quickly because of the fact that putrefaction is an essential thing to destroy certain of these food products in order that we may live. If that is the condition then oral prophylaxis had better be stopped because we will all die very soon. However, let that theory be as it may, the best we can do with this subject at this time, it seems to me, is rather a general discussion of the question as a whole.

We know in the development of man and animal that there are certain changes going on constantly in the body; growth and development follow a certain well-defined line, and try to attain to as high a standard of physical excellence as is possible. On the other hand, we find a great army of so-called microbes that are constantly working for the destruction of all organic substance. On one hand it is the effort of the human race to develop, while on the other hand it is the effort of the bacteria to destroy that development after it has been fully formed.

There seems to be a constant effort to pronounce lactic acid as the agent that produces dental caries. If you will read Miller's work carefully you will find that Miller has said that he believes lactic acid is the cause of dental caries, for the reason that he was able to produce lactic acid artificially from some of these microorganisms that are in the oral cavity with certain foodstuff. Now, therefore, we assume that lactic acid is the probable cause, but when you go to work in these mouths, as I have done, and try to find lactic acid in the acid mouth, in the acid saliva, in the decomposing substance, and you cannot be sure of lactic acid, why a question might rise in the mind of some as to whether it was lactic acid that did it or not. However, we must give Miller credit for one thing, and that is that he found these microorganisms in decayed teeth. He found these microorganisms in number and quantity sufficient to produce fermentation. He also demonstrated that the dental caries artificially produced was quite like caries in the human mouth. However, if you take sections of teeth in which the caries appear, and make sections of these

teeth and study them microscopically, and take a tooth that you have put in a dish in which the microorganism comes in contact with only one part of that tooth, where the acid condition is produced upon the surface of the enamel in one particular place, and examine it microscopically, you will find that there is a vast difference in the appearance microscopically. Now, these are only suggestions to be worked out, and very likely in a few years we may find that a good deal of the work that we have done in the past that we think is so exact is positively wrong. In that is the evolution of progress. And when we find that we are wrong, we can only take up the work and try to right it again.

But, I can say, I think, with some feeling of authority, that there has never been any diseased condition presented to the human race the cause of which looks so plausible as the germ theory of caries of teeth. With that germ theory of the cause of decay of teeth has come a lot of abuse, some of which I learned here in the discussion of a paper; the use of antiseptic mouthwashes, and all these things that you expect to destroy.

The theory about the tubercle bacilli being so essential to lung tissue; why I would hate awfully bad to find a patch of them growing in my lung anyway. I would feel like Mr. Dooley did when he had appendicitis. He said just as soon as he found the weeds growing in that appendix he immediately consulted a doctor and he had the appendix removed, because he did not want that sage brush to grow in there, be jabers, any longer than it had to. That is the way I feel about the tubercle bacilli. I would want to get it out.

The treatment of tuberculosis probably is not exactly on the subject, but since it has been brought up (the treatment of tuberculosis), about a year ago I took the time to look up the various treatments of tuberculosis that had been introduced since Koch discovered the tubercle bacilli in the sputum of patients, and you would be surprised to discover that there have been about 720 different treatments, all of which are excellent. But people are dying today of tuberculosis just the same. The question of growth of these microorganisms is a question of environment for them the same as the question of environment for the human race. These microorganisms are quite like all of the higher animal forms

of life in that they must have organic substance to live. A few bacteria have been found that can produce their own body development out of inorganic substance, but it is not the rule, and these that produce disease and these that produce fermentation are bacteria that are unable to live in inorganic substances, but must have organic substance, and that is the reason why they are so universally parasitic in their form of growth and development. But environments favor growth, and development is an important feature, and it is as well illustrated probably in the fungus that grows, so-called wheat rust. Why do not we have our wheat destroyed every year by the wheat rust? Because of the environment of the wheat. The garden hyacinth that grows and has a fungus that grows on it produces the so-called hyacinth rust, is a fungus that can grow upon that hyacinth only under certain circumstances, and that is a good deal the way with the growth of bacteria in the oral cavity. All of it depends upon certain environed conditions for the microorganisms and certain foodstuff for them. So this is a broad biological subject. It pertains to one of the most interesting studies that is known to man; to understand the environed conditions of the human race on one hand and the environed conditions of the microorganism on the other. So that we think of fermentation as only producing lactic acid. Now, there are four or five organic acids that are produced by bacteria, and some of them have as much effect on the surface of enamel as lactic acid and in some instances more.

You cannot produce these acids artificially to any great extent. You must first have the substance and then you must have the agent to place in with the substance in order to bring about the reaction that produces a particular kind of acid. We can have almost an acid blood, but we never have found an acid blood in anybody's veins or arteries who were living. It can get pretty nearly to an acid condition, and that brings up an important subject that we cannot get this condition from any source that is strongly acid or alkali. It must be practically neutral. We use acids in our foodstuffs, and consequently our foodstuff becomes very largely a neutral substance before we assimilate it into the body.

Now, if this acid condition that was spoken of, Dr. Talbot's

theory, if this acid condition existed in the body, why is it that we have, when we have the nearness to an acid blood, that we have calcific formations in the joints? We have the so-called rheumatic calcification, supposed to be, however, uric acid; we have these urates formed. Now, if we had an acid supplying this, why would not it neutralize all of these substances? Why, if we had the acid condition that we would not the calcific formation around the necks of teeth, if it is so decidedly important? Those are questions that we might think about a little bit. I do not know whether I am correct or not, but I am simply reasoning this. I want to place it to your reason if I can in such a way that you will understand what I mean. How can we have all this calcific formation if we have an acid formation that breaks up this calcific formation so easily? How can we have this formation and have this blood go into the teeth and take out little particles of this inorganic substance and carry it away, and finally tear down the inherent physical properties of that tooth in a way that will bring about a predisposition to caries? This is a question I cannot quite make up my mind is correct when I take in all of the conditions that bring about this cause.

The acid of the blood; I do not know just what acid it is. It has been found in the muscles, and in active muscular exercise they have found lactic acid.

Now, the conditions that come about in so-called acidosis patients is not the destruction so much of the calcific portion of the body as it is the disturbance of the nutritive function, and it is these nutritive disturbances that we find are destroying the resistance of the body and bringing about predisposition to external causes of disease. When you get extreme changes of nutritive function in the body you get a saliva that is very capable of producing acids in the mouth; not only sometimes does the mucus itself become acid, but with the bacteria can produce acids much better.

Dr. Gillis (closing discussion): I hardly think there needs to be any closing only as a matter of form. Dr. Bozer spoke of one thing to which I simply want to give my hearty indorsement, and that is in not leaving a little carious dentin in the bottom of the cavity. Some folks do leave it there and claim that they can

use drugs which will neutralize or inhibit the action of any other germs there. I do not believe it. If it is so close to the pulp that further excavation would expose the pulp, then the germs of the disease have penetrated to the pulp, and no drugs can be put in there powerful enough to kill the germs without being a devitalizing power on the pulp itself, and it is only a matter of time until the patient would come back with a worse toothache than in the beginning, so just save yourself the trouble of treating and refilling by putting in a good filling in the beginning.

I am glad I said some things I did because it gave Dr. Cook something to talk about. I believe from all indications that he has no tubercular patches on his lungs. The ancients, going further back than those of whom I spoke, held to the worm theory of decay. I would like to ask Dr. Cook if they did not take that from the fact that they found the pulp which resembles a worm and this led them to what they called the worm theory of decay? I have read that they got the theory from the fact that they were able to get the pulp out of the teeth, and it looked like a little worm. This subject has been much discussed, that is true. It is as old almost as caries itself, and we cannot hope to arrive at any definite conclusion or solve the problems definitely here. But the words that appear on the cover of the *Dental Cosmos* can apply here in this discussion. "Observe, Compare, Reflect, Record," and possibly in the millennium we will have all of these questions settled.

DEGENERACY.

BY H. R. RAPER, D.D.S., INDIANAPOLIS, IND. READ BEFORE THE NORTHERN INDIANA DENTAL SOCIETY, AT FORT WAYNE, SEPTEMBER 8-9, 1908.

The object of this paper is to give you some idea of what is meant by degeneracy, and thereby lessen the prevalent prejudice against giving it as a cause of various anomalies of the mouth.

A degenerate organ is one so altered, congenitally, as to less efficiently perform its particular function, and is hence subject to destruction or elimination. For example, a cleft tongue.

A degenerate organism is one congenitally unfit to live in the

environment in which it finds itself placed, and is hence subject to destruction or elimination. For example, the inmates of our feeble-minded institutions.

Evolution, from a lower to a higher type, is a process of adaptation to environment. Man is highest on the ladder of evolution because, of all animals, he is the best fitted to live on this earth.

Adaptation involves retrogressive changes in some organs as well as progressive changes in others. That is, some parts of the organism degenerate while others elaborate. For example, observe in man, in the course of his evolution, the elaboration of the cranium with the accompanying degeneration of the facial bones. Suppose, now, the retrogressive changes occurring in the degenerating organs of a given organism are markedly amplified and degenerative alterations occur also in the organs in which, in the course of evolution, elaborative changes should occur. Such an organism is rendered more or less unfit to live in its environment, and is therefore more or less a degenerate.

All elaboration and degeneration is accomplished by heredity. Hence to give degeneracy as a cause for a condition is not disputing the word of the man who says heredity is responsible. It is just narrowing the field a bit; telling the kind of heredity, i. e., that it is retrogressive.

There is a strong sentiment against giving degeneracy as an etiologic factor for any abnormality. The universal misunderstanding seems to be that only degenerates have stigmata or marks of degeneracy. Dr. Black, in his talk about supernumerary teeth, given at the Semi-Centennial Meeting of the Indiana State Dental Association in June, said in substance, "I do not think supernumerary teeth are a stigma of degeneracy. I do not think a man is a degenerate because he has supernumerary teeth." Now, I *do* think supernumerary teeth are a stigma of degeneracy, but with Dr. Black, I do not think a man is a degenerate because he has supernumerary teeth. A man is not a degenerate because he has one stigma of degeneracy. Talbot finds on examination of forty-two cases, not of the defective or degenerate class, that the average number of stigmata in each is eight. We then, who call ourselves normal, have an average of eight stigmata each.

There are two grand classes of degeneracy—mental and physical. Though not always, the one usually implies the other. (Dr. Hunt here calls my attention to this fact: It is more common for a mental degenerate to be a physical one, too, than it is for a physical degenerate to be also a mental defective. The explanation of this is, that cerebral elaboration, with accompanying degeneration of the organism as a whole, is in line with the general evolutionary tendencies of the race; while the combination of a degenerate mind and a good body is directly opposed to said tendencies, and atavistic in nature.) Concerning mental degeneracy, Dr. Dubois, a French authority on nervous disorders, says: "However brilliant may be the qualities of our mind we shall always find in some corner of our soul a weakness, a rebellious defect. All of us are, on some point or other, weak-minded. Nobody can flatter himself that he possesses complete mental equilibrium." If this is true of the mental man, and it is, why not true too of the physical? It is generally conceded that epilepsy is a stigma of mental degeneracy. Yet Goldsmith, Burns, Lamb and Cowper were all epileptic. We do not class these men as degenerates because of their epilepsy. One stigma does not make a degenerate; it takes many. This being the case why should we hesitate to call hare-lip, occurring in a "normal" individual, a stigma of degeneracy? Or why should we say, "No, I do not think supernumerary teeth are a sign of degeneracy. One of the brightest men I ever knew had a supernumerary tooth?"

Dr. Moorehead of Chicago tells of two cases of cleft-palate and hare-lip where the parents of the children would not permit an operation because they religiously believed that the Almighty would be offended if they did. They believed their God had sent them deformed children for some particular purpose and that to have the deformity corrected would be interfering with His plans. The result is that today those children are frightfully deformed young men, too old now to be operated upon, and destined to drag, pitifully, through a miserable existence to a kind death. I consider such a religious belief a stigma of mental degeneracy, and I am not surprised to find the physical ones of hare-lip and cleft-palate occurring in the offspring of those who entertained it. Nature could not have chosen a more unique manner of

eliminating the family than by the combination of such mental and physical anomalies.

I consider the following stigmata of degeneracy: (1) Supernumerary teeth. (2) "Enamel drops," the little pearls of enamel occurring imbedded in the cementum on the roots of teeth. (Let me suggest here the name *enameloma* as a more scientific term than "enamel drop" or "enamel pearl.") (3) Some malformed teeth; where the history shows no syphilis in the family, and no exanthematous disease, at the proper age, in the case. (4) A very high vault. (5) Some cases of malocclusion: Those where no mechanical cause can be found and heredity is given. (6) Congenital hare-lip. (7) Congenital cleft-palate. I accept the intrauterine pressure theory where it seems plausible, but a slight cleft of the soft palate or a perforation can hardly be due to intrauterine pressure. (8) Tongue tie. (9) Cleft-tongue.

I give degeneracy as the cause of the foregoing abnormalities for four reasons: (1) According to the best definitions of degeneracy they are stigmata. (2) They occur more freely among the degenerate classes. (3) I prefer degeneracy to heredity because it is more specific, it being a kind of heredity. (4) It is as near the truth as I can get. I shall be glad to discard it, and I hope I have the chance, for a better explanation of these wonderful phenomena.

Discussion:—*Dr. Hugo H. Meier,* Fort Wayne, Ind.: Perhaps I have not followed the same line of reasoning that Dr. Raper has, but I have had the same teacher; therefore, my line of thought may be right along the line he has suggested, and I cannot criticize him. I differ from Dr. Raper in his definition of degeneracy, where he seems to lay it all to congenital causes. I differ from him because I think both physical and mental degeneracy can be produced after birth. There are plenty of examples of this kind. For example, the atrophy of a limb. As to mental degeneracy there is a great deal of mental degeneracy following sickness; in fact, a great percentage. I am sure that ten or fifteen per cent would be due to sickness after the mind is developed. As for Dr. Raper's reasons, or causes, rather, for the stigmata of degeneracy, I think they are very good. While he confines them

principally to the teeth and the mouth, still they would apply, in my estimation, to the body as a whole, because of the fact that most physical degenerates and mental degenerates are possessed of these ordinary stigmata.

He gives an illustration of the fact that a number of brilliant writers of past ages were epileptics, which is quite true. I wish to add to that, however, that to Napoleon and Cæsar were attributed brilliancy of mind, and they were both, according to history, epileptics. Still they were very bright men along their particular lines. In fact, there are no individuals who have made history any more than Napoleon or Cæsar. On that particular line I wish to say that it is generally thought by those in authority that most of the religions, such as Mormonism and Christian Science, and like sects, have been created by individuals who were primarily epileptics. Joseph Smith, who originated Mormonism, presumably saw a vision of the tablets on which he built his creed during an epileptic seizure; and, knowing the history of epilepsy, anybody who has studied it would take that as a very plausible solution for the origin of the tablets. As for Dowie, a more recent example, Dowie was a paretic. Paresis is generally conceded as being due to syphilis in a great many cases, and a great deal of epilepsy is attributed primarily to syphilis. So from this you might surmise that Dowie was an epileptic, and need we say that he was certainly a mental degenerate?

You, in all probability, know of a great many of very prominent people who are epileptics, but are generally conceded to be pretty bright individuals. There are samples about town which I might mention.

Another type of degeneracy, an example of which I know in my own experience, is an epileptic, a man who married a feeble-minded woman. They at the present time have a progeny of seven children, all of whom are feeble-minded, and all of whom are members of the feeble-minded institution here. I give that as an illustration to show you how degeneracy may be propagated.

In the feeble-minded institution of this city there are a great number of inmates who are known as low grades, who are not possessed of the slightest bit of mental energy. They have not the slightest faculty for reasoning or thinking. In fact, they

have to be dressed and fed. In examining the low grades, as they are called, you will find a great percentage of these low grades are almost physically perfect, still their mentality is impaired. Dr. Raper's illustration of degeneracy is along a line of thought which I am not in a position to discuss, as my line of thought has been degeneracy as a whole, and that has not been so very thorough, so I will beg to be excused from any further discussion.

Dr. R. R. Gillis, Hammond, Ind.: It just happens that among the notes which I have taken appears something along exactly this same line, and I believe it would fit in better here than in the later discussion of the other subject, so I will offer it now. I found it in an article by Dr. Eugene Talbot, in the *Cosmos* of 1905. He follows very much the same line of reasoning, only that he considers that degeneracy may be the result of evolution. As man has developed from the lower animals, he has lost some features while he has gained others. In the economy of growth the brain has been developed at the expense of the jaws and teeth. If we study the lower forms of reptiles, we find that their jaw is excessive in proportion to their brain. As we come up through the scale of reptiles and marsupials, up to the shark, and up to the other animals in order of consequence, and to man, we find that the jaw constantly recedes; the cranium correspondingly increases. The brain has developed at the expense of the anterior portion of the head, the bony portion. The original teeth were cone-shaped, and we find these in some of the birds that have teeth, and in some of the reptiles, and as we advance in the scale of development, in the animal kingdom we find that these cone-shaped teeth either develop into multiform teeth or that several of these cone-shaped teeth coalesce into one multiform tooth. It is not certain yet whether it is several cone-shaped teeth that develop into one or that one of these original cone-shaped teeth budded out and formed cusps and multiple roots. However, as we advance in the scale we find that the teeth develop in their various shapes, and that further advance means fewer teeth. Some of the reptiles have as many as seventy-two teeth; man in his higher development has only thirty-two, and probably in the years to come he will not have that many, for

we find at the present time many people who do not erupt their third molars. In studying along the scale we find that usually the tooth has been dropped from the back of the jaw. At any rate, as the jaw recedes fewer teeth can be accommodated, consequently fewer teeth are developed in the advancing generations. So when you see a patient whose third molars have never erupted, don't consider it a stigmata or sign of degeneracy. That person has simply reached such a stage of advanced brain development that the compensating shortening of the jaws compels the non-development of another tooth.

Dr. G. W. Cook, Chicago: I presume that I can discuss this subject about as well as any of them. I do not know a thing about it. I suppose, however, that I have plenty of company. I do not think anybody knows anything about it. It is a good deal of guesswork. We could talk about the many cases that come into our everyday practice, probably, that would indicate physical and mental degeneracy. We could discuss everyday observation on the street; we could pick out faces and forms of people who we would apply as physical degenerates or mental degenerates.

I think the keynote was struck when it was said that we were all degenerates, but it was just a matter of degree. Possibly that is true of the statement made in the paper that the development of man has been through a process whereby he lost certain features and certain conditions and had added to that other things of more importance. It seems to me that it is impossible to separate mental and physical degeneracy, or to say that this is a particular mental condition and say that there is no special deformity physically, and vice versa.

I have in mind a case that I have known since the childhood of the patient. She was born and developed to about four years of age, a bright, healthy child. Today, or soon after the period of four years was reached, there became an arrested development of all the parts of the body, and with the arrested development of the body apparently the mental process became arrested. She is now twenty-six years of age, and she is four years old. She is not four years old in stature, she has grown probably to about half the size of what she would have been normally, provided

we take the family back as a standard. She has a fully developed set of teeth (32), and all are in practically perfect condition, but she has a four-year-old mind, and about a ten or eleven year old body. Her parents are normal, and, so far as the history can be traced, there are no degenerates, no epileptics, and no deformities in the family. Now, why did that development stop? Is it congenital or was it acquired? Was it inherited or was it acquired after or at the time of four years of age? I should say in this case that it was an acquired condition, and that it was due to malnutrition, because after the child was six years of age it fell into the hands of a physician who was a very skilful man in the art of infant feeding, and believed in the proper feeding of children; then the child began to grow, and after they separated the child and the physician at ten years of age, the development stopped physically. Now, whether the feeding or the care that the child received during that period, or advice as to what they should do with the child, had anything to do with its mental condition or its physical condition, I am not able to say, but it would seem to me that intelligent advice on that line from an intelligent individual always has a great deal to do with whether we have degenerates or not, physically or mentally.

Anyone who is familiar with feeding hogs or stock of any description can readily understand that feeding and the care of the animal has a great deal to do with its development. Of course, in this country we have crossed breeds and have developed some very high forms of animal life, and I think an illustration of what we can develop from plant life has been shown many times in horticulture. Now, I do not believe so much in this prenatal degeneracy. I believe a great deal in the environment and in the nutrition of the individual at the time certain periods in the life are reached. Of course, we might discuss for all times the so-called Rue theory of heredity; one claims one thing, and another another. The same is true today. But because we have people that do not have well-defined erupted third molars, I do not think that that is necessarily an indication that they are degenerates. It is an indication of environment. And because we have a well-developed brain, and one capable of reasoning at least across the street about things, it does not mean that we are going to lose the

use of our lower jaw. If we use the jaws or the brain and properly care for them continuously from birth until the proper age that we should be properly developed, we would not have as many epileptics, we would not have as many degenerates in our institutions. I have spent almost twenty years of my life in dispensary work among a very low or poor class of individuals, and among a class where degeneracy, so called, appears; and my observation is that many of these come about later after the birth of the child, and it is due to the method of living, to the things that they have to eat, and to the care of the body in general. I do not think because we happen to meet a palsied person on the street we could say that it was a degenerate. We say this of people who are confined in our institutions for feeble-minded and epileptics, who have acquired, by methods of living and by means of living, these conditions. Of course, probably it was necessary for Napoleon to have a fit in order to be a great general, and I suppose many of us when we become great will have some sort of a fit.

Oftentimes certain persons, overcome by certain excesses or excitement, do some wonderful things in the midst of excitement in the matter of strength or brain development. Now those persons are not necessarily degenerates, but it is because of the environment and conditions, and the excitement that comes on at that time, and in that very excitement there may be an ebb of vitality that may bring about later in life a degeneracy, and then if you can find away back in that family a person who had a fit on the street or in the fields, or something of the kind—"Why, yes, there is the cause." I tell you our environment has a great deal to do with our health, our appearance and our teeth, and if we do not have the proper nutrition and physical care we should not expect to be anything else but degenerates, and because we are degenerates we need not lay it to our ancestors. They were probably just like we are, and did not do a very wise thing through life, and consequently we have to suffer.

But I question how much benefit we get out of these discussions. The thing that strikes me, and if I were going to offer a suggestion on this paper in any way, shape or form, it would be this: That the person who is going to study degeneracy take

the latest form of plant or animal life and study its environments and study its conditions, and with the microscope try to observe the cellular degeneracy. Why do we have these forms of degenerate microscopic cellular structures? Is it because their ancestors were that way? Or is it because we have changed their environment?

I am not criticizing the paper—because I think it was well thought out in the so-called orthodox way of taking up degeneracy—when I say that the great trouble with the subject of degeneracy is we do not take up the microscopic things and study them, and study the cellular structure of the mental condition of the individual to see whether or not there is any change in the cellular structure of the brain, and to see what changes take place. The mere gross appearance of the brain, I do not believe, teaches us anything about degeneracy.

You see a one-sided child; you see the head on one side, and the median line is very largely out of proportion. This does not necessarily mean that the child is a degenerate, but that it was carried on the mother's arm on the same side, and the brain development was not equal on both sides. Now, it is necessary that we take into consideration that we are considering a subject of this kind. That we cannot call all people that seem to have little peg third molars degenerates. Supernumerary teeth may be no more than a hypertrophic development due to some environment or condition at the time of the enamel formation.

So, as I said when I started out, I know so little about the subject that I feel hardly worthy of consuming your time, but I have observed that we do not study in the right direction. We take a gross man, and because he happened to look so-and-so when a child, and way back in the family history there was syphilis or there was tuberculosis, we might just as well say that he is tubercular or syphilitic in many instances. We do not look at the time the child was living. We do not consider that the growth of children from the time of birth until they are old enough to masticate and properly insalivate their food, that that is the greatest period in the life of the individual; that period at which they have to take out of the world a certain amount of

substance and digest it, and they are poorly prepared for it because of their environments.

Those are the things that, in my mind and in my observation, teach us to think less of inheritance of those things and about congenital deformities that follow up in the human race.

The paper, as I said before, is well thought out and it has some good thoughts in it, but, if I were going to make a suggestion, I should suggest again that the student should first of all become acquainted with the lowest forms of life, and then study some of the higher forms, and in that way we can judge from the lower to the higher as to how much we have, and remember all the time that every man who has written upon this subject is a degenerate himself. If we take the type that they give us they are all degenerates. They have the marks of degeneracy. Heckle was a great writer on pathologic phenomenon and he was a kind of a degenerate. And many of our best authors carry out the type that they give us. If you follow it up many of them are degenerates, just as these great poets were epileptics.

Dr. F. M. Bozer, Logansport, Ind.: Just one thought occurred to me during this discussion along a different line than has been discussed, and that is voluntary degeneracy. For instance, an individual comes into this world and develops to a certain point of life, then there takes place, to quite an extent, an arrest of both moral and mental, and, possibly, physical development, because of inactivity, or, in plain language, laziness, pure and simple. If there is not such a thing as voluntary degeneracy, it possibly might be more interesting to discuss the subject of involuntary degeneracy.

Dr. Raper (closing discussion): After reading my paper, Dr. Meier said to me: "Why, is there anybody who does not believe hare-lip and cleft-palate are stigmata of degeneracy?" I then told him that Dr. T. W. Brophy, at the meeting of our state society at Indianapolis in June, had stated plainly that he did not think cleft-palate and hare-lip were stigmata of degeneracy. It seems to be a fad among Chicago men to attack any stand taken by Dr. Eugene S. Talbot. All (they think) they need to do to be right is to learn what Talbot says about the matter, then get

on the other side of the fence. And since Talbot believes that cleft-palate and hare-lip are stigmata of degeneracy, Chicago men do not.

The following data were gathered in defense of the assertion that congenital cleft-palate and hare-lip occur more freely among degenerate classes: Of the 8,347 feeble-minded children in the various institutions of the United States I find 17 congenital hare-lips and 20 congenital cleft-palates. On first thought it seems that these abnormalities are not, after all, marks of degeneracy, there being only 17 of the one and 20 of the other among 8,347 children. But now that is a big per cent when compared with the normal occurrence. Stop and consider. How many people have you seen during your lifetime? And how many hare-lips have you seen? I have lived in Indianapolis for five years. In that length of time, beyond the shadow of a doubt, I have seen at least 300,000 faces, and I have seen, and been on the lookout for them, only three cases of hare-lip. That is, one case to every 100,000 people. While the occurrence among the feeble-minded is two cases to every 1,000.

Dr. Cook speaks of cellular degeneration. You use the word degeneration there simply as a synonym for destruction, do you not, doctor? (Dr. Cook: Not necessarily.) Well, we do not have cellular degeneration without cellular destruction.

Now let me read again the definition of a degenerate organ: "A degenerate organ is one so altered, *congenitally,* as to less efficiently perform its particular function, and is hence subject to destruction or elimination." Therefore, if, *after birth,* there are causes, bacteriologic, pathologic or traumatic, that bring about some destructive change in an organ, said organ is *not* a *true* degenerate one. For all true degeneracy is accomplished by heredity.

Dr. Cook tells us that feeding is what counts when it comes to raising hogs. If the doctor will take a razor-back hog out of Texas and feed him well enough and long enough to get him fat, I will admit that feeding is of more importance than breeding. Do not place too much importance on the feed, doctor. You could never make a vulture out of a canary bird. The canary would die on the diet.

The doctor doubts if we are benefited much by such discussion as this of my paper. So do I, looking at the matter from a narrow, "practical" viewpoint. Discussions of this kind are, to an extent, I admit, just matters of mental gymnastic—mental exercise. But mental exercise is, of course, a very good thing, though the benefit we derive therefrom is not immediately tangible. What benefits do we, as men, derive from the works of Darwin? None, absolutely none, according to our ultra "practical" brothers.

Concerning "voluntary degeneracy," nobody can voluntarily become a mental, moral or physical degenerate. Degenerates are born, not made. A degenerate is a degenerate because he cannot be anything else, just as a genius is helplessly a genius.

ETIOLOGY OF HARE-LIP AND CLEFT-PALATE.

BY W. D. CALVIN, M.D., FORT WAYNE, IND. READ BEFORE THE NORTHERN INDIANA DENTAL SOCIETY, HELD AT FORT WAYNE, SEPTEMBER 8-9, 1908.

It is not my intent to inflict upon you a lengthy thesis on the allied or compound subject of hare-lip and cleft-palate, advocating when *not* to operate, when to operate, or how to operate upon such cases. This phase of the subject will be left for the surgeon, who is so frequently called upon to correct misguided Nature.

Upon consulting the literature on this topic I find that volumes of a practical nature have been written upon its surgical phase; but, on the other hand, that the literature on its etiology is very theoretical.

Prevention depending, as it does, upon etiology, makes the latter subject of prime importance; at present, however, there is not a satisfactorily proven cause recognized as an etiologic factor in the production of hare-lip and cleft-palate; its etiology is in the empirical state, therefore the limitations of this paper will, in the main, be to compile some of the past recorded cases; add a few heretofore not reported to the list, in the hope that others may be given by those present, and in the absence of a more scientific method, that these increased number of reported cases may assist in determining, to a greater certainty, the cause or causes of these conditions.

Admitting that different causes may produce the same results, we may then conclude that these malformations may be dependent upon one of many possible causes; this does not, however, weaken our belief in the axiom that like causes are prone to produce like results.

Hare-lip and cleft-palate are due to *arrested development* (which term should not be confused with *arrested growth*), dependent upon parental influences. It is claimed that these influences must be before the tenth week of fetal life in order to be operative.

The formation of the maxilla begins at a very early period of intrauterine life, at about the 27th or 30th day, by the formation of four tubercles near the central portion of that surface of the rudimentary head which is destined to form the face, and which are named the superior or frontal processes or tubercles, and the lateral or oblique maxillary process or tubercles. The superior processes elongate downward and at the same time approach each other toward the median line. The lateral processes also elongate and approach each other toward the median line, where they finally meet the superior processes and unite with them, thus forming the lateral halves of the superior maxillary bone, palate bone, the cheeks, the lateral portions of the upper lip and velum palati.

The frontal processes occasionally fail to unite upon the median line, but it is not uncommon for the oblique maxillary processes of either side to fail to unite with the frontal processes, and occasionally both sides fail, thus producing either a single or double fissure.

This malformation may assume various forms:

(1) A mere notch in the red edge of the lip.

(2) A cleft through the soft portions of the lip.

(3) A cleft through the lip and nostril and a cleft-palate.

(4) Double hare-lip with a floating intermaxillary bone and cleft-palate. A variety witnessed in one-tenth of all cases, according to Dr. F. J. Shepherd.

Single hare-lip occurs most frequently on the left side.

Several causes have been advocated as etiologic factors.

Maternal impressions have been advanced by a few writers, but denied by most.

Dr. Truman W. Brophy in speaking of etiology says: "The

predisposing cause is heredity, the exciting cause is mechanical; the application of the force of lower jaw against the upper jaw in embryo, thus producing a failure of union." Dr. Brophy emphasizes the statement that *"Nature does not fail to develop the necessary bone and soft parts to form a normal palate, but it does fail to bring the parts into apposition and unite them."*

Of 1,300 cases he has operated upon, he has made the observation that the breadth of the upper jaw, as compared to the lower, is just as much broader than it should be as the distance between the borders of the fissure.

Faulty nutrition has been charged as a cause, as in cases where meat had been excluded from the diet, or where an unsufficient amount of calcium phosphate has been introduced into the physical economy of the pregnant mother.

Observations made at the London, Dublin and Philadelphia zoologic gardens upon lions fed on meat of large animals having bones too large to crush and swallow was followed by the birth of cubs, 90 per cent of which had cleft-palate. The food was corrected and these lions were fed upon smaller-boned animals and some ground bone, with the result that later born cubs had normal palates. It is not astonishing that many rachitic lions are born in captivity. Cleft-palate has been observed in dogs, sheep and goats on restricted diets.

Bland Sutton's experience with dogs indicates not only the presence of this deformity, but its transmission. Wm. K. Gregory, Wm. Turner, Bland Sutton and D. J. Cunningham, all men connected with zoologic gardens, claim never to have seen a wild animal with cleft-palate. Frank E. Beddard reports a litter of tiger cubs, all with cleft-palates. Hagenbach of Hamburg, who furnishes the zoologic gardens of the world with wild animals, claims never to have heard of a case of cleft-palate in wild animals.

But this preponderance of negative evidence does not prove its non-existence for three reasons:

1st. Hare-lip predisposes to infection by pathogenic bacteria, hence off-spring born in a wild state are not likely to survive.

2d. It affects ability to nurse and receive nutrition.

3d. And most important, wild animals destroy soon after birth off-springs which to them appear peculiar.

The percentage among defective classes is much larger than among normal individuals. Five per cent of 1,200 criminals examined by Knecht had cleft-palate. In an examination of 495 criminal boys at Illinois State Reformatory and 1,080 at a similar New York institution 1 per cent was found so afflicted. Fourteen per cent of the prostitutes examined by Pauline Tarmonsky had cleft-palate. Langdon Doane found one-half per cent among congenital idiots. These percentages would be larger were it not for the excessive number of early deaths among the defective classes. Observations made at the Indiana School for Feeble Minded do not confirm these claims as to this deformity. It is claimed that interference in palate formation must begin comparatively early in embryogeny and hence must imply decided effect on the part of the parents. Any material factor, whether arising during a particular pregnancy, may so check the development of the palate as to produce the various types of this deformity.

Also that maternal environment has here, as elsewhere, great influence. A defective mother may be so influenced by favorable environment during the same period that the embyro would not only pass through these periods of intrauterine life successfully, but would likewise acquire increased potentiality of passing through the later periods successfully.

On the other hand, an evil environment or an environment change for the worse soon after impregnation unfavorably affects embryogeny.

I now come to the etiologic factor that is desired to emphasize in this paper: *hereditary influences*. Hereditary involves the complex of type heredity; remote atavism; individual defects or peculiarities of immediate ancestors; maternal environment and stress period environment. Direct heredity can only operate when in embryonic existence by the law of economy of growth; the embryogeny is centered around a given line of least resistance during the struggle for existence between the organs for assimilable nutriment. While defective ancestors may have defective children the line of direct expression of the defect is interrupted by the influence of atavism and by the influence of varying environments during embryogeny. In the cases that will later be referred to, I would have you note that they cover only a few

generations; also that no attempt by most writers reporting such cases has been made to account for appearance of the *first* case, but that whatever may have been the first cause, the tendency to heredity thereafter is very marked.

In its general application and results, heredity is the strongest influence that characterizes all living things, man included, and him, both physically and mentally. The appearance of a case of unprecedented cleft-palate and hare-lip in a family is proof that some potent influence has manifested itself; overpowered the natural laws of heredity and produced this condition and observation shows that the descendants of this one are many times more liable to manifest this same or similar condition than are other people.

To test the full powers of heredity in hare-lip or cleft-palate, it would be necessary that marriages should take place between those so afflicted, and who will here doubt but that in a few generations we would breed a class of people among whom it would be an exception to find one not so afflicted?

It is not enough to simply observe that in this rather rare condition, the tendency of some persons having cleft-palate to beget descendants showing some defect, without, at the same time, recognizing the forces that influence in preventing such appearance, the mixing of new blood and thus adding new strength, a powerful corrective, then the law of direct heredity, bringing with it the natural law of nature and the strength of all those ancestors who have had normal palates.

It is when we recognize the tendency of heredity in cleft-palate overcoming those other powerful, recognized and antagonistic laws of heredity that we can fully realize what heredity in cleft-palate really means.

The problem of most import in etiology is the cause producing the first case in a given family, as in this case we expect to find the seed; it matters little whether it is the first influence that is exercised throughout the chain of cases or whether this first influence has spent itself in producing the first malformation, and that those following are but secondary pictures of such result; in both cases it is hereditary.

Under this heading I wish to refer to consanguineous mar-

riages. There is a diversity of opinion relative to the subject of consanguineous marriages; they are condemned by the Laws of Manu; Mosaic Code; Laws of Rome; the Decrees of the Christian Councils, and the Texts of the Koran. Opinion has been averse to them among nearly all civilized people. Darwin states that the consequences of close in-breeding in animals carried on for too long a time produces loss of size, vigor and fertility.

Prosper Lucas and Dr. Boudin, two eminent authors on this subject, condemn the practice without reserve, claiming that it is the direct cause of many morbid phenomena, several of which concern the mental life, as for instance, deaf muteness, idiocy and epilepsy.

Dr. Boudin in his "Memoirs de le Societe d'Anthropologie" among 10,000 Catholics, three deaf mutes; 10,000 Protestants, six deaf mutes; among 10,000 Jews twenty-seven deaf mutes. This corresponds to percentage of consanguineous marriages among these people. Among the negroes, among whom promiscuity is common, show ninety-one times as many deaf mutes as the whites.

I have called attention to the question of consanguineous marriages because of the fact that in two of the cases to be reported, it was the only possible etiologic factor found, and it is not known whether it was present in any or many of the other cases, because, judging from the absence of any reference to any attempt to find the cause in the initial cases, the reports are valueless as to that point.

Skeen's Surgery, Vol. 3, page 621, gives history of following case: Parent normal; nine normal children and one son, John, had hare-lip. John had one son, hare-lip; his sister, normal, had seven children, five of whom had cleft-palate. An aunt of John's had one child with hare-lip and four other normal children.

Dr. J. S. Marshall, in *Dental Cosmos,* says "the question of hereditary influence is one that calls for more than passing notice." He quotes Oakley Coles as having mentioned two families in which there was a marked tendency in this direction. In the first family there were three with cleft-palate, one seventeen years, one thirty and one thirty-five; the first and last were

ladies; the gentleman is married without a single instance appearing in his children. The second family is composed of five children, two of whom had fissure lip and palate; first child born perfect; second child born with single hare-lip and cleft-palate; third child born perfect; fourth child born double hare-lip and cleft-palate; fifth child born perfect.

Lawson Tait believes that heredity is a strong factor in the production of this deformity and says he has known it to skip three generations and then appear in a hereditary form.

E. F. Plicque reports a case of hare-lip in a female in which he thinks the deformity is undoubtedly inherited. The family history is as follows: Both parents were entirely free from congenital defects; one of father's brothers had supernumerary fingers; a brother of her mother was born with hare-lip, but both of his children were free from the deformity; his sister, the mother of the patient, has given birth to nine children, five of whom had hare-lip, but no cleft-palate; another sister of patient's mother was free from congenital defect, gave birth to two children with hare-lip and cleft-palate of an unusually severe type. A brother and a sister of the patient had hare-lip, both of whom had married, but none of their five children were so afflicted.

Manley says that in all his cases there is either a history of heredity or maternal impression.

Dr. Marshall operated on a child six months old with double fissure of the upper lip and hard palate, with protrusion of the intermaxillary bones, this being the second child of the same parents in which the tendency was marked.

Dr. Brophy reports the following case in *Dental Cosmos,* 1901, page 340: "This little child was a brother of the girl previously exhibited; it was interesting to note in this connection that of the six children born to the parents of these two, four of them were defective in this particular. The oldest one was healthy and no evidence of the deformity existed even to the slightest degree. The second was afflicted with double hare-lip and cleft-palate; the third with hare-lip; the fourth with double hare-lip and cleft-palate; fifth was normal; sixth single hare-lip and cleft-palate.

"The deformities in these children, in addition to many other

cases, have confirmed my opinion that many such cases have an hereditary origin; the paternal grandfather of these children having been similarly afflicted. In a case of a child previously operated upon I learned that the father's brother, and an uncle on the mother's side, also an uncle on his father's side, had cleft-palates; although the parents had normal palates, their oldest child had hare-lip, but this palate was normal, and the only other child had double deformity."

The following cases have been furnished me by my confreres in Fort Wayne:

Dr. Guy Smith reports the following case: Mrs. M. had cleft-palate and lateral spinal curvature; brother has hare-lip and talipes; father and mother and one child healthy.

Dr. E. E. Morgan has observed two cases as follows: Mrs. C. has hare-lip and cleft-palate; three of five children have hare-lip or cleft-palate and hare-lip. Mr. Z. has hare-lip. Has one child with deformed forearm; radius absent and four fingers absent; elbow ankylosed; does not know condition of other two children. Nothing known of parents.

Dr. M. F. Porter reports a family showing one case of hare-lip and two of spina-bifida.

Case reported by Dr. C. H. English: Mr. and Mrs. G. were cousins; daughter No. 1 normal, but son had cleft-palate and hare-lip; he in turn had a son with cleft-palate and hare-lip. Daughter No. 2 had a daughter who had double talipesequni and whose hands were badly deformed.

Dr. J. D. Chambers reports two cases, brothers who are so marked, but does not know anything about ancestors or descendants.

Dr. S. D. Sledd reports two cases of cleft-palate in one family.

The exciting cause for writing this paper resulted from the interest aroused by the following case observed in the writer's practice:

Six years ago I confined Mrs. D., primipara, who gave birth to a son with hare-lip; operated at seventh week; has always been undersized; weighs at present thirty pounds.

Four years ago gave birth to a daughter, normal and healthy; present weight twenty-nine pounds.

Two and a half years ago gave birth to a daughter, double hare-lip and corresponding clefts; Dr. M. F. Porter operated at eighth week; present weight eighteen pounds.

Seven months ago an embryo was passed without known cause; the specimen shows a condition of hare-lip. Nothing of interest is found in the family history of the father of these children, but the parents of the mother were cousins and the sister has the deformity.

The mother has been characterized with nausea during most of time of all her pregnancies, and while carrying the two deformed children complained of much pain across lower part of back, and with last child had daily pains similar to labor pains from fourth month to termination of pregnancy.

To epitomize and conclude: We may agree that this deformity is the result of arrested development. It is frequently found in families showing other forms of arrested development. It undoubtedly depends upon some of the same causes as produce other forms of arrested development. That there is a strong hereditary tendency in its propagation is certain. The first cause or causes are uncertain. That consanguinity may be one is possible, judging from the other defects in the physical economy that seem to depend upon this cause, together with the cases of this malformation in which consanguinity is a preceding condition.

And finally it seems very important that more care be taken in securing such family histories; more observation be made in caring for pregnant women who have given birth to such children or in whose families such cases have appeared.

SURGERY OF HARE-LIP AND CLEFT-PALATE.

BY GEORGE E. JOHNSON, D.D.S., FORT WAYNE, IND. STEREOPTICON LECTURE DELIVERED BEFORE THE NORTHERN INDIANA DENTAL SOCIETY, AT FORT WAYNE, SEPTEMBER 8-9, 1908.

I appreciate the honor you have conferred upon me, and if I shall in any way make new suggestions or give one new thought I shall be well repaid for the work that I have taken up. I have spent weeks of time making a research of the history

and progress of the profession on surgery of cleft-palate and hare-lip. To give a synopsis I propose to take up the embryologic aspect first, to embellish Dr. Calvin's paper. Next I shall take up the surgery of cleft-palate, and the point I wish to emphasize is the point that Dr. Brophy, that fearless and most skilful surgeon of our day, in 1891, when he brought forth the statement that immediately after birth the poor little unfortunate should be operated on as soon as health and strength would permit.

Fig. 0.

He was hooted and scorned, but today it is an accepted fact that that is the time to operate on the poor little unfortunate. Then, later in life, I shall take up with the illustrated slides the operation as it is performed upon the adult, and, since the operation for cleft-palate and hare-lip are so closely united I shall take up also with the slides the operation for hare-lip.

Fig. 0. I have here upon the screen "Meditation." The rise and progress of any art or science is the result of meditation. "Observe, compare, reflect, record," and passing from meditation we will take the next slide. Fig. 1. This is a human fœtus of twenty-one days, showing the villi of the chorian, fetal portion of the placenta, amniotic fluid, umbilical vesicle, and also the position of the head, and it occurred to me while I was painting

this that possibly the direct cause of cleft-palate might be a diminution of the amniotic fluid and the contraction of the uterus, bringing the head forward with the lower jaw on the chest and keeping the cleft open until past the time at which it should close.

Passing to the next slide, Fig. 2, here is a painting of the embryologic face of twenty-eight days. Of course, the mouth is represented open. It is straightened out. The tendency is to coil up as a watch spring as you see in Fig. 1. Here is the nasal process (2), this represents the eye (10), and ear down

Fig. 1.

here (11). By exerting pressure in its coiled position with the diminution of the amniotic fluid, pressure could be brought to keep that cleft open until after the seventy-fifth day.

Fig. 3 shows the features and the mouth at thirty-five days. The same with this painting as the other, the mouth is left open. But the fortieth day you see the nares coming very close together, the clefts are almost closed, and yet the mouth is very large. The eyes are down at this point below the nasal cavities.

In Fig. 4 you will see how the eyes have raised at about the seventy-fifth day. You see by a pressure here at the cleft, and holding those processes apart until after the period at which it should close, there is a failure of plastic adhesion, and the secret

of cleft-plate and hare-lip is solved at once if that is true. Of course there are hereditary causes such as impoverishment, as I will show in one of the next plates.

Fig 2.

Fig. 5. This is a well-formed fœtus, a painting that I made directly from nature at about seventy-five days, showing that the

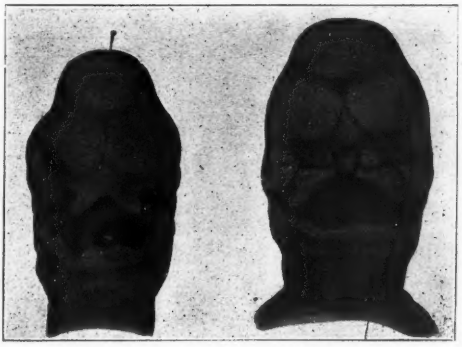

Fig. 3.

cleft has closed. The next slide, Fig. 6, the same size, about seventy-five days, is the specimen I painted from Nature. You see the impoverishment of the fœtus. You can see every ridge

in the transparency, showing its very bones. You see it has a full hare-lip and cleft-palate on the left side. Impoverishment

Fig. 4.

in this case was undoubtedly one of the causes of this cleft, as the mother bearing the fœtus had labor-pains nearly all the time up to the time of miscarriage.

Fig. 5.

Fig. 6.

A case reported by Dr. G. V. I. Brown, Fig. 7, represents a little baby, at which time, as early after birth as possible, the operation should be performed. The ideal time to perform that

operation would be when Nature fails to close the cleft, but since that is impossible the next best time is as soon after birth as the health of the child will permit it.

Fig. 8 shows the same child immediately after the operation.

Fig. 7.

And, poor little fellow, he has a look as much as to say, "What are you going to do with me next?" A case also reported by Dr. Brown. Fig. 9 will show the little boy, just a little older,

Fig. 8.

four years old, with a double hare-lip and cleft-palate, and Fig. 10 will show him after the operation with very much the same expression, a "hang-dog" look.

Now, we take up the operative technique of cleft-palate in the child. Fig. 11 will show the germs of the temporary teeth at birth. In passing the sutures, silver wire sutures, just over the

vault of the superior maxillary arch, through the floor of the nares, we escape the germs of both the permanent and temporary teeth.

Now, I will take up the teeth development, showing, as we go along the line, we are constantly getting into trouble by delaying the operation. You see the germs are developing higher and higher, and Fig. 12 will show them just a little more developed. You see they are still higher, higher. Every day, every week, every month we postpone the operation the more difficult it becomes; Fig. 13 showing the development of the teeth still

Fig. 9.

Fig. 10.

higher. You all see the development of the first bicuspid at this point. In attempting to pass a suture at that age you see we run onto very vital points, and Fig. 14 will show still further development. Starting with development of the cuspids, and the development of the bicuspids, Fig. 15 will show that we are getting still deeper into trouble. See the germs forming are almost entirely blocking the way, and the next slide, Fig. 16, will show that it is almost an impossibility to get a suture through to close the congenital fissure of the maxillary bone.

Figs. 17 and 18 will show that the teeth are developing still higher and higher. Fig. 19 shows the development of the teeth, with the bicuspids and the six-year molars erupted, and the bony process at this time has become so very firm that it would be

impossible to attempt to draw the maxillary bones together at the fissure. Here, Fig. 20, is the full development of the permanent set of teeth except the third molar, and the bony process is so firmly formed at this time at the age of 18 that an operation at

Fig. 11.

that time is only possible by using the osteotome and peeling the mucous membrane and tissue down from the periosteum to the roof of the mouth.

Fig. 21 shows the development of the third molars, the full de-

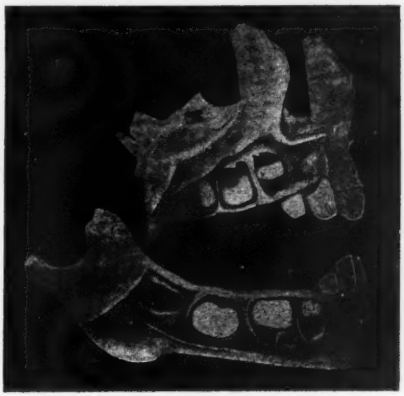

Fig. 12.

velopment. Fig. 22 shows the operation of drawing maxillary processes together with silver wire sutures. I have shown in the development of the teeth there that we are constantly getting into trouble; not only ourselves, but for the child, every day, every year, that we postpone the operation. This is a section view of

the child's jaws, showing the general view of the maxillary process. This is Dr. Brophy's operation, running his silver wire suture through the maxillary process, above the germs of the teeth, peeling or freshening the surfaces of those two bones, and heroically twisting these wires and drawing them together.

In the operation upon the child, Dr. Brophy made the incision directly across horizontally above the tooth germs. I would make an incision up through to the antrum of Highmore at an angle of forty-five degrees and bring the force as far up here as possible, to make it as easy to draw these silver wire sutures as it is possible. In the course of time this space is filled with new bony

Fig. 13.

process, and the resonance of the voice is not injured. The ideal time to operate is upon the infant; that is the time. Of course, the dentists do not see the infants at birth, it is the physician who then can best advise the mother what to do. It has been urged that there is too great a risk in operating at that time. I would state that I should operate at that time providing the child could have the proper care, providing the child could have the proper antiseptic nursing afterward, providing the child had no scrofulous disease of any kind; that would be the ideal time. It has been argued by many that the shock at that time is too great. Well, I certainly would operate at that time, and if the shock is too great in the light of the heredity which Dr. Calvin has brought out, if

the shock is too great and the infant dies—all well and good; it would be a blessing to the child and a blessing to the world. However, if the operation can be performed nicely, and we can overcome in time the hereditary tendencies, that would be the time for the skilful surgeon to do the operation.

As I said before, when Dr. Brophy first brought out this operation, he was taken to be one of the most cruel human beings on earth. Today he is respected because it is right.

Fig. 23 shows where the bony process has been drawn together. As Dr. Calvin quoted Dr. Brophy, the space between here at the

Fig. 14.

cleft is equal to the space of the extra width of the roof of the mouth, so the arch is nearly the proper size when these surfaces are drawn together. As the development of the teeth come on they act as so many wedges in the development of the superior maxillary bone.

Fig. 24, one of the very early operations; this is one of the most empirical operations that was ever thought of. This is the plate with the cleft. Elliptical incisions were made and gauze forced in to bring the edges of the cleft together. In this day and age of modern antiseptic surgery we would certainly laugh at an operation like that. And Fig. 25 will show you an operation that has been abandoned. The operation is as follows: After peeling

down the tissue from the periosteum of the roof of the mouth the tissue is split instead of freshening the edges, and two rows of sutures are made. Fig. 26 will show you the first row of sutures being inserted. It might seem like an easy thing to split that tissue, just about the same as splitting a piece of tissue paper.

Fig. 27 will show you a portion of the first row of sutures sewed up entirely, and the next row down to the third stitch. This operation is not a practical operation. Why? Because we must have braces across here to support the tissues until plastic

Fig. 15.

adhesions have taken place. Who of the modern surgeons would think of placing any tissues together without binding, and without putting adhesive strips or splints or bandages; or, if it is bone, who would think of bringing bones together without at least wiring so that they may be held positively intact, without any chance of breaking up adhesions? So this operation was a failure. It was performed years ago, before Dr. Brophy brought out his operation.

Fig. 28 will show you another operation which was equally as bad. After sewing up the line of sutures, an elliptical incision was made on each side near the alveolar process, and with the engine holes were drilled through the process and the maxillary

segments were chiseled loose and processes brought together. No surgeon would think of doing an operation like that today.

Fig. 29 will show you the modern operation as it was done by Dr. Garretson. The ideal operation is to remove as little of the tissue as possible in freshening the edges of the cleft. Dr. Garretson is cutting a great slice from the edge. The operation, when completed, shows the cleft in the tissue and roof of the mouth on a level with the teeth. Taking out one-eighth or one-fourth inch

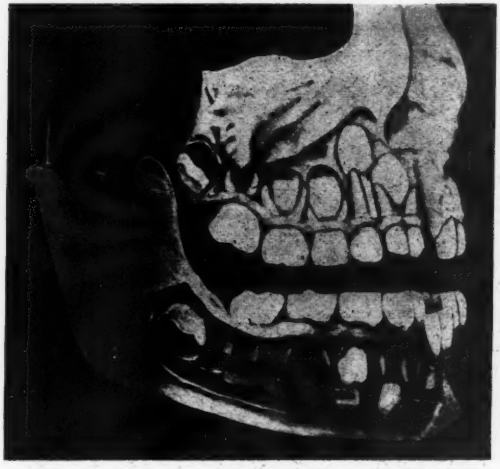

Fig. 16.

each side, you see he would lower the vault of the arch very materially.

Fig. 30, inserting the sutures after freshening the edges, and Fig. 31 will show you Dr. Ferguson's operation for relieving the tension by dividing the tensor palati muscle, which today would not be considered at all, because there is no occasion, no necessity, if there has been a sufficient amount of tissue provided for to relieve the tension, and a very large majority of the cases were failures because of the need of a brace across the cleft to support those stitches.

Fig. 32 will show just the scraping or the freshening of the tissues with a lancet, not to remove much of the tissue, and it occurred to me after looking at that cut that by the aid of the den-

tal engine and a very coarse carborundum wheel (you dentists know that we frequently abrade the surface of the mouth by an accident of the wheel slipping), that the removal of the epithelial layer down to the connective tissue would be the ideal freshening of these surfaces. Those of you who have performed the operation for cleft-palate know how very difficult it is to take a very thin slice off from either side. It is a very difficult operation, but with the use of the dental engine and a coarse carborundum wheel,

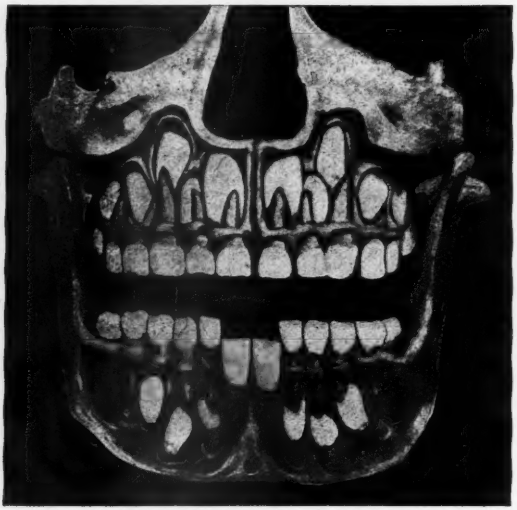

Fig. 17.

gripping the end of the uvula with a tissue forcep, the carborundum wheel running at high speed, just a few revolutions, and you can freshen that edge very nicely. This is, by the way, just a suggestion; I have not tried it, but it occurs to me that it would be the ideal way or method of freshening these edges.

Fig. 33 will show you Dr. Brophy's operation of lowering the vault of the arch and lengthening the palate when it seems to be short. In an adult subject it is necessary to lower the vault in order to bring those edges together.

This, Fig. 34, shows you Dr. Brophy's operation with the lead plates and the silver wire suture crossing the arch at that point, the coaptation sutures in situ ready to be drawn together.

The next plate, Fig. 35, will show you the coaptation sutures, the lead plates and the silver sutures twisted together, giving an ideal support to the palate without the division of the tensor palati muscle. Now, Dr. Brophy urges that the elliptic incision should not be made, as there is a formation of scar tissue at that point, and by the use of the lead plate braces there is no occasion for it, which seems very reasonable indeed. This, Fig. 36, will show you the lowering of the vault of the arch by the use of the os-

Fig. 18.

teotome. Of course, in these cases of cleft-palate, in adult cases, the upper arch is the width of the cleft too broad, which we cannot overcome.

Now we come to the operation of the hare-lip, which is so intimately connected with the operation for cleft-palate. The old operation for hare-lip was to simply freshen the edges and bring them together. The result was there was always a V-shaped notch in the lip.

Fig. 37 will show you the manner of preparing for the sutures which will produce the proper alignment, and Fig. 38 shows sutures in situ. Fig. 39 will show you a still better plan for the saving of tissue, and that is to begin at this point, after adjusting the

hare-lip clamp with a soft pine stick, or a little board on the under side, take a curved bistory and, bringing it down in that fashion, and with the hare-lip clamp in position to control the hemorrhage, freshen the edges on the other side to make the perfect Cupid's bow, Fig. 40. That is the ideal way to prepare hare-lip for the sutures.

Fig. 41 is a double hare-lip. Fig. 42 will show the results of the operation. That is the highest success of art in surgery is to make the lip as nearly normal as possible, but in order to free the tissue, the tissues should be dissected away from the maxillary

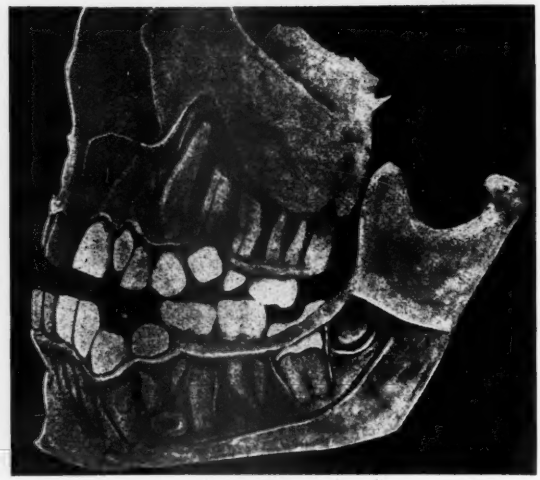

Fig. 19.

bone, so there will be no drawing or puckering of the lip after operation. A case reported by Dr. George T. Carpenter.

Fig. 43 will show a double hare-lip; Fig. 44 will show you the cleft in the roof of the mouth, and Fig. 45, after the patient has been operated upon, showing the results of modern surgery. What a boon to humanity; what a blessing to the unfortunate. Blessed be the man who can find out the cause and prevent those cases. Blessed, noble, is the man who can put up the fence, but equally noble is the man who can bring the ambulance for the unfortunate. The physicians today are in a position to instruct the mother to

avoid an occurrence like this. They are the ones who can put up the fence.

Fig. 46 will show you the man who brought the ambulance. And Fig. 47 will show you the ministering angel bringing healing in her wings, typical of modern surgery.

DISCUSSION ON PAPERS BY DRS. CALVIN AND JOHNSON.—*Dr. F. R. Henshaw,* Middletown, Ind.: In the first place, I desire to compliment both of these gentlemen on the nature of the papers which they have given, and I cannot but feel that

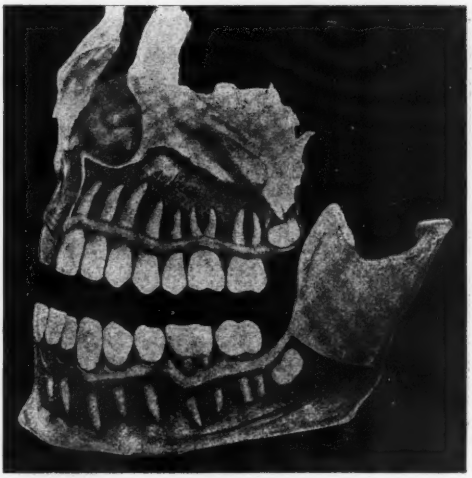

Fig. 20.

a society of this kind should take very deep interest in a subject which has been so beautifully and ably presented as this. Naturally it is something that cannot come within the field of the average practitioner. Naturally, too, there are isolated cases which come before all of us, which, if we have listened to such papers as we have heard tonight, would put us in the position to be of eternal assistance and value to these poor unfortunates. My personal experience in matters of this kind has not been great, and yet I think nothing has ever touched my heart more than one or two instances which have come under my personal observation. When I first entered practice, among my first acquaintances were two little girls, both of them beautiful chil-

dren, probably six years old. We became very fast friends. One of these children had a single hare-lip and cleft-palate, which had been operated on in her early infancy by one of the best-known surgeons in eastern Indiana. However, the operation had proven a failure. The child's voice was defective, her articulation was defective, the process of deglutition was impaired, and, as is almost universally, I believe, the case with children of that kind, she was shy and timid and sensitive. We became, however, very great friends, and her parents being well-to-do people, and she being an only child—and, by the way, there was absolutely no

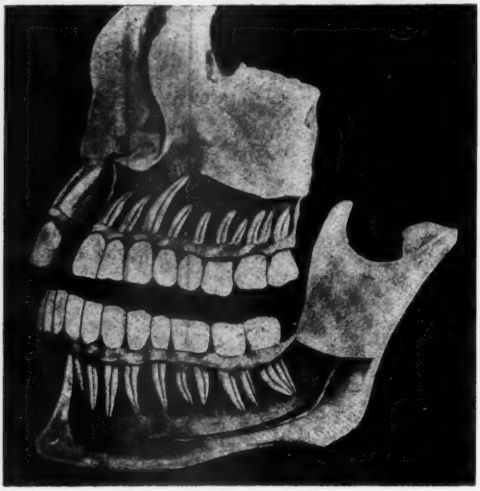

Fig. 21.

history which could be traced back on either side of her family which could account for this affliction—after a few years I was able to induce the father to take this child to Dr. Brophy, whom I had learned to know and love, and whose operations I had witnessed, and despite the fact that a bungling operation had been performed, in this case Dr. Brophy was able to so repair this child's palate and uvula and restore the contour of the mouth that today she is a very handsome young woman, and a very talented musician, occupying a prominent position in society, and one of the most respected and sought-after young ladies of my acquaint-

ance. So I feel that a part of the credit of that is due to me, and I know that this young lady feels that a great part of the credit is due to me, for I think that I have no warmer friends in the world than this child and her parents.

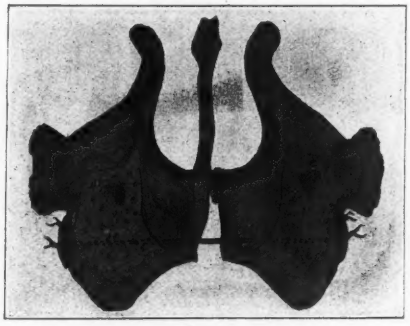

Fig. 22.

Another case that came within my observation a few years ago. Dr. Byram was visiting me, and one day a local physician and surgeon (and, by the way, oftentimes in little country towns there are very skilful surgeons hidden away from the rest of the

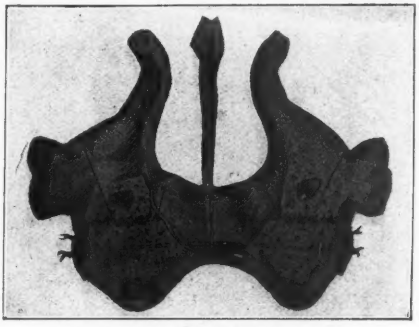

Fig. 23.

world), a very competent local surgeon, dropped in and asked us if we would like to go out and watch him perform an operation for cleft-palate on an infant, probably ten weeks old. We went with the doctor and assisted in this operation, and while it was skilfully done, the environment of it was so pitiful that it has al-

ways touched my heart to think of it. The operation was done in a small farm house room on an ordinary table, and with every disadvantage in the world, and although it was successful it has been always a nightmare to me. I hope I shall never witness

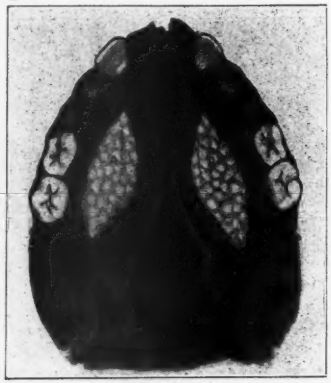

Fig. 24.

anything of the kind again, because there are men who are equipped, who have devoted their hours day and night to the study of this very particular thing, and to these men it is due that every case of this kind be sent.

Fig. 25.

I learned last night of a case that seems to me particularly pitiful: I learned of a young man with a double hare-lip and cleft-palate, whose mother had been similarly afflicted, who had been married to a young woman who was also so afflicted. My

God! what might be expected of their off-spring? There is one of the wrong things that so frequently occur in this world. We have police powers in the state of Indiana; you all know how well they are enforced. I think that one of the great duties of

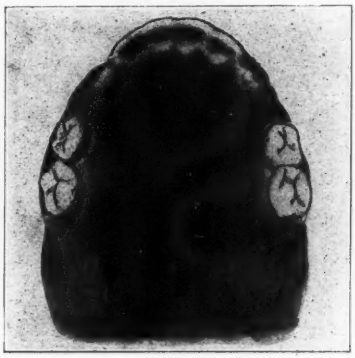

Fig. 26.

every medical and dental society in the world is the absolute enforcement of the police laws which say that tubercular patients may not marry, and there should be a clause in there which says that the man who has a history of hare-lip and cleft-palate may

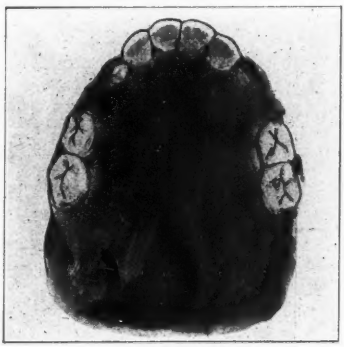

Fig. 27.

not marry. I think that the duty of every dental and medical society in the world is to absolutely see that these laws are enforced. Then we have our fence up. Otherwise they will go over the cliff, and Dr. Johnson and Dr. Brophy and all those

men who have devoted their time to the cause must take them up in the ambulance.

Dr. M. F. Porter, ————————, Ind.: Speaking of the ques-

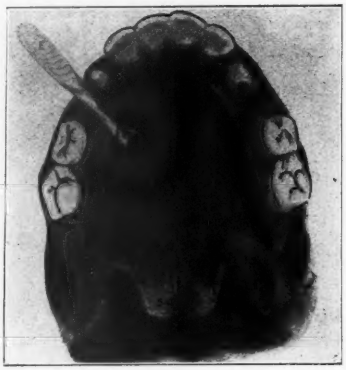

Fig. 28.

tion of heredity, my own impression is that there was a time after the thorough establishment of the germ theory of disease when we were inclined perhaps to pay less attention to the force

Fig. 29.

of hereditary tendencies than really was warranted by the facts observed. We got into the habit of paying very little attention to the potential power of heredity; for instance, in the transmission of consumption. And perhaps in other directions we got

to under-rating the force of inheritance in the transmission, not only of disease, but of deformity. I know of nothing that illustrates to my mind better the force of the something which we call hereditary force, which is inherent in an individual from one source or another (nobody knows exactly what the something

Fig. 30.

is, and possibly never will), than the results of the experiments that have lately been done in connection with the transmission of cancer.

You take the cancer as it develops in the waltzing mouse and graft it into another mouse of the same species. In almost every

Fig. 31.

Fig. 32.

instance the graft takes and the mouse develops cancer. You graft one of the ordinary house mice, and practically speaking the graft never takes. But if you cross the Japanese mouse with the house mouse and then graft the hybrid that is bred from this cross, in about 50 per cent of cases the implantation takes. It is to my mind one of the best examples of the force of the in-

herent something in the tissues that makes Jones not susceptible to consumption and on the other hand makes Smith an easy prey to it. So that there is much in heredity, as applied not only, as I said before, to diseases, but to deformity as well; there can be no question about that in my mind.

I had not studied the subject with a view to talking on it. There is no question but that it is an established fact that defectives are apt to breed defectives of some sort. That is to say, a club-footed individual may not breed a club-footed child, but he is more apt to breed a case of scoliosis or cleft-palate than is a person of good ancestry. But when you come to speak of

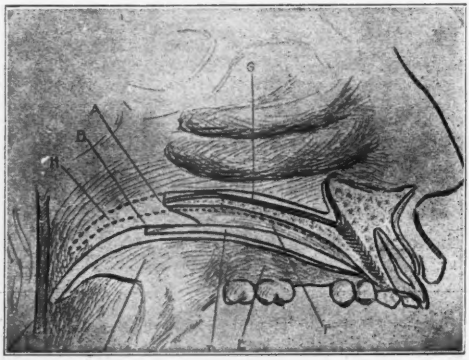

Fig. 33.

wiping out this hereditary influence by preventing marriage of defectives, or by anything that we may do in this generation, that will show itself in this generation or even in generations to come, you should stop to think that we have tried over a multitude of generations to breed deformities artificially produced and have failed. So you see what the outlook must be when you come to speak of wiping out these hereditary diseases and deformities, one of which is hare-lip.

I am sorry to seem at all to differ with anything that Dr. Johnson said, because one never likes in the least to do anything that will make a guest feel uncomfortable; and, on the other hand, as a guest he does not like to make his host feel uncomfortable; but I am quite confident that Dr. Johnson does not interpret, in fact, I know that he does not interpret, Dr. Fergu-

son's operation correctly. These incisions in the side of the palate are not made for freeing the tensor palati. They are not where the tensor palati is at all. The object of this incision, Dr. Johnson, is to do away with the tension, and while it is true that quite a large percentage of these cases fail, it is true, on the other hand, that the vast majority of them do not fail at all, for the tension is relieved whether the thing is splinted or not. The splint does something, that is to say, it in a certain measure prevents the movement of the palate which occurs during phonation, etc. And herein lies one of the inherent difficulties in obtaining that degree of success here that is obtained in other parts of the body. You

Fig. 34.

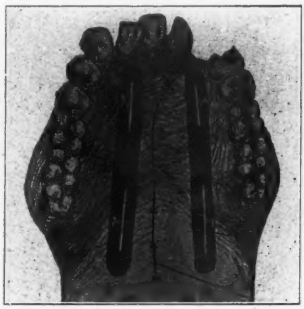

Fig. 35.

cannot keep these parts quiet as you can keep an arm quiet. Another inherent difficulty is the difficulty, the absolute impossibility, of keeping these parts in an aseptic condition. And here again comes the forceful illustration of the fact that perhaps after all the best antiseptic treatment is the aseptic treatment, and the best aseptic results are arrived at through a first-class resistance in the individual upon whom you are operating. Now these cases should get well; the majority of them in good hands get well, and they do not give much trouble, these cases of cleft-palate, in spite of the presence of septic material. They get well in spite of the fact that those parts are not kept quiet, and the explanation in my judgment is because they are unusually well supplied with blood. And if this blood supply is kept to as

nearly the normal point as possible, then union will almost invariably result after you have thoroughly freshened your edges and have secured coaptation without tension. And in this connection again let me assure you that your blood supply will not be up to the normal, in fact, it will be infinitely below the normal if there is any tension on the flaps, or if there is undue traumatism.

A man who cannot with a knife denude the edges of the cleft, by taking off a thin strip, has no business to try to do the operation. You can take it off with a bur, but it seems to me that the bur would produce more trauma than the knife.

But the wound which is produced with the least possible

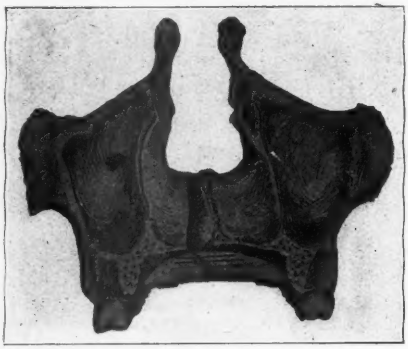

Fig. 36.

trauma, with scissors, will not unite so well as will a wound made with the knife. So, the denudation made with the bur is not the denudation made by the surgeon by any means. I do not, therefore, believe that a carborundum wheel will ever be used.

While I am on this point, another point, and that is the freshening of the edges in hare-lip. The several schemes that the doctor noticed are, of course, recognized ones among surgeons today who are doing this work, but the objection to the doctor's method, and the doctor will find it a real one when he does many of these operations, is that the bringing down of the flap from one side for the purpose of producing the Cupid's bow effect, instead of taking over the margins of both lips, makes the lower

margin of the lip too thin. If you look at that picture, doctor, it illustrates what I mean. The upper end of this cleft is too thin to make a good free margin. In order to avoid that it is frequently better to take both edges, using only the lower and thicker half of each and discard the upper and thinner portions.

This brings me to another point, and that is that in my judg-

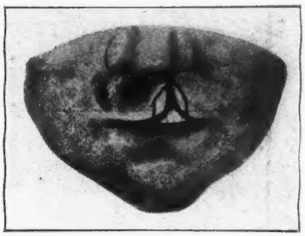

Fig. 37.

ment, and I believe it is the judgment of men who have done a great deal of work along this line, that any man who ties himself to any operation for hare-lip or cleft-palate, and, on the other hand, any man who ties himself to any particular method of doing any particular operation, will never achieve that success in surgery that would be possible for him to achieve if he were thoroughly well acquainted with all of the different methods and could

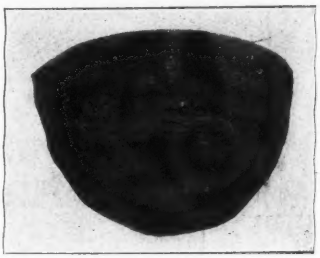

Fig. 38.

adopt a method to suit the case. But personally, I will say this, that a hare-lip pin is inexcusable. In my own judgment, under ordinary circumstances, any stitch that shows in the face should be looked upon askance. It is not necessary ordinarily at all, for a stitch in the skin that shows.

In the ordinary wound about the face, and particularly if that

wound happens to be in a girl, or a wound any place else that will show, under ordinary circumstances, should be coapted by subcuticular stitches or plaster, or both. It is not up to what I consider to be really advanced, front-rank surgery to use stitches through the skin in wounds that show.

As to the time of operating, nine-tenths of these patients will

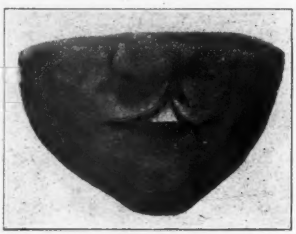

Fig. 39.

never phonate perfectly, not even if they are operated the next day after they are born. The reason is that there is in these cases an arrest of development, and this arrest is more or less permanent. No matter how early the cleft is repaired the muscles of phonation remain imperfect. So that very few of these patients, no matter how early the operation is done, will ever phonate as

Fig. 40.

well as a child born with a perfect palate. If too much is promised these individuals in the way of phonation they will be displeased when they come to grow up. One of the greatest reasons in my mind for doing these operations early is not because you have a more perfect palate than when it is done late. In fact, some of the finest results, so far as appearances were concerned, I have ever seen, have been in operations done late. One of the

best reasons for doing the operation early is because, not that you hope to give the individual a perfect palate, but that you want to commence to train him very early to do well with an imperfect palate. If the operation is done early he commences talking early with as perfect a palate as he has, and finally learns to use it very well, just as a man born with one-inch shortening in

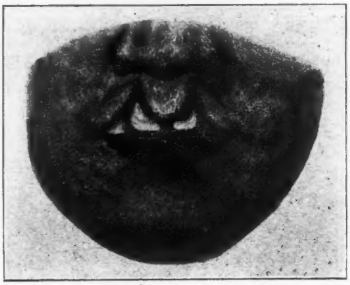

Fig. 41.

one of the hips will not notice it, although "one of his legs is longer than it really ought to be," or shorter.

Dr. Geo. W. Cook, Chicago: I would much rather hear the medical men talk on this subject because I really think they know something about it. However, there have been many points

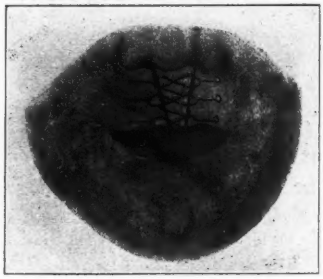

Fig. 42.

brought up that are interesting to me, and the first one was the first paper of the evening, and that was the etiology. Of course, this discussion came up in rather a different form than in the dental society, and it pleased me because it coincided with some remarks that I have made before.

Dr. Porter's discussion of this operation seems to me to have struck the keynote to the whole situation. It is not when you operate so much except that you operate at the proper time. The age of the individual does not make so much difference provided you can perform the operation suitably. Now I have operated on a few of these cases; most of the cases that I operated on, however, did not live, fortunately for me and the patient too. I am a good deal like a good old Chicago surgeon, who many years ago reported fourteen cases of appendicitis on which he operated, thirteen of which died. The main object of writing the paper

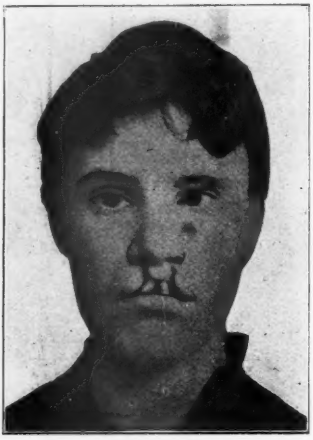

Fig. 43.

was to show people that many of these so-called successful operations really die after all.

The question of the development or the lack of development in these cases, in my belief, from purely a biologic standpoint, means nutrition in the majority of instances. It may not mean nutrition to the individual at this time, but it may have been back in the ancestry and as a part of the inheritance. And if we follow up as was done by the first essayist, if we follow those cases as he reported them, we will find, if we can look into not only the case that was reported, but to various members of each generation having cleft-palate, we would find that there was a deformity or a lack of development somewhere else in the individual and pos-

sibly an inherited condition also of the muscular and other active tissues of the body.

Dr. Porter has brought that out in one of the best forms that I have ever heard it explained, and I am merely getting up to say that a meeting of this kind is certainly beneficial to the dental profession, and possibly some benefit may be derived by the medical profession. They will say possibly that we are not such bad-looking fellows after all—that is, all of us—and they will see that we are in earnest in our effort to do something in our line of work, to study these conditions together. The medical man

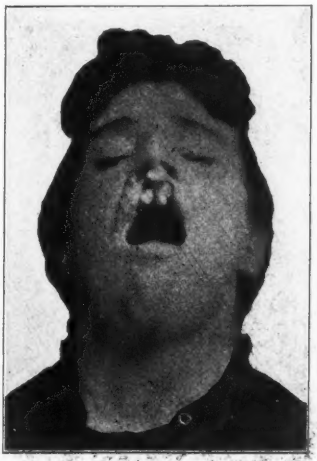

Fig. 44.

is the fellow, I suppose, that really has to put up the fence and run the ambulance. We just stand in the corner. We come across many of these cases after all the surgeons of the country have operated on them, and we really have to make a mechanical appliance for the persons to retain their food and a place where they can possibly swallow. That has been in the phase where the dentist has had to deal with cleft-palates. A few men have made specialties of the operation, Brophy and Marshall and a few others have led out and achieved some success in the surgery of cleft-palate and hare-lip, but the average dentist meets with these cases, and meets with them under different circum-

stances. Sometimes he refers them to the general surgeon, or to the specialist like Brother Henshaw did.

I hope we will have more of these discussions and more of these papers, for we as dentists need something of this kind, and we have been very much benefited. I want to thank the two medical men who have spoken on this subject for the clear, lucid way in which they have brought this subject before us for our consideration. Dr. Johnson's discussion of the subject interests us because he belongs, I believe, to our profession, and we are

Fig. 45.

interested in the members of our profession. But I want to especially thank the two medical men that have spoken on this subject, because they have brought out some points that have never been touched upon so far as I know, and I have read a good deal of the literature.

Dr. McOscar, Fort Wayne: I know of one child in Fort Wayne who was operated on by Dr. Brophy. It was my privilege to be present when there were four in the room with Dr. Brophy, including the assistant who gave the ether. For three hours I watched the work of Dr. Brophy in performing the operation which gave a very excellent function to a child who was born very badly deformed. The defect was a very unsightly one,

being as perfect a cleft, both of the hard palate and the lip, as a person would wish to see. Dr. Johnson's insisting upon the early operation being done I think is in accord with Dr. Brophy's position on this point.

After drilling through the superior maxillary, the breaking down of the bone on each side was required because of the hardening to some extent which had taken place in the four-months-old baby, and would not have been necessary had the operation been done in the first week. That being true it would have been much better if it had been operated on eleven to fifteen weeks earlier. I called attention to the appearance of this child's mouse-shaped face when the superior maxillary bone had

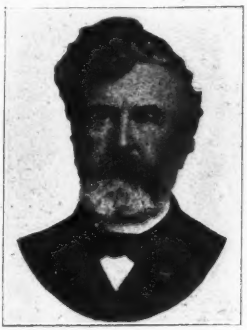

Fig. 46.

been drawn together with the plates adjusted. The doctor said that is all right, because it was done early enough; and the softened condition of the bone will permit of development, and there will be a widening out of the face again. That was true in this particular child.

Splints on the soft palate which have been spoken of are not necessary in the infant who is operated early. Of course, the child who is operated late will require additional means of immobilization of the parts during the healing process.

Dr. Nierman: Brophy's operation has in its favor the age of the child to be operated on. Sensation in the first few hours of life is not very pronounced, and the action of the heart is stronger and of greater vitality than later in the age of the

patient. Under asphyxia it is said to withstand the strain from one to five minutes longer than is ordinarily to be found in the beating of the heart.

His operation might be criticized on the claim of the plates preventing the cutting of sutures because they act as broad surfaces that won't pull through. When examined, it will be found that the plates are on an incline and the stitching for this reason puts its sutures on a pull in the tissues instead of on the plates, which permits of tearing of the stitch channels quite as well as

Fig. 47.

if there had been no splints employed. In the hands of the author himself I have no doubt his operations do credit to his brilliant career as a surgeon.

When viewing the situation for an ideal method of procedure, it appears that Dr. Allen's operation comes more closely to meeting the plan than any known to me. His conception is to bring the membranous surface of one side of the nasal cavity to act as the oral surface in the mouth; he transfers a flap from the mouth, to floor the base of the nasal passage, making the two outer sides membranous and the apposing surfaces raw tissue. The blood supply is not cut off and the union of these parts

should be good, and to avoid separation thereof he devised a spring that holds the jaws in place by pressure on its curvatures from the outside of the face.

Dr. Buchman: I know absolutely nothing about the surgery of these cases; not a thing. Therefore, I would only be occupying your time and annoying you if I were to assume to say a word about it in its surgical aspect. Heredity and arrested development needs to be more studied than it has been in the past, and it occurs to me that if we want to find out the facts we will have to take up Mendel's law of heredity and study it and apply it to these cases, after which we can say with absolute certainty whether these cases are due to hereditary influences or due to some intrauterine accident.

A majority of medical men come to conclusions in regard to heredity too rapidly; there is not reasoning enough done. The field is not made broad enough, and the elements that go to make up what we call an hereditary condition are not well thought out. Take Mendel's law, for instance, and you can trace the heredity from one generation to another, and you can make a calculation as to how many in a given family will escape the influences of the hereditary taint, and how many others within a certain limited number are going to be affected by it. Personally, I believe that a good many of these cases are due to intrauterine accidents. During the period of gestation an accident of some sort, which perhaps is rather difficult to find out, is sufficient to arrest the development in some particular area.

Dr. W. D. Calvin: I will be very brief in closing. In the first place I want to call attention of those present to the subject of heredity, and request that you read Ribot's work on that subject. I think you will find it extremely interesting and logical and extremely stimulating to further investigation and study on that subject. Dr. Buchman's statement that the majority of the medical men come to conclusions concerning heredity too quickly, I think is true and is not true. I mean this, that it is one of the subjects that we medical men have not studied enough, and that we can take a few courses on this subject with profit. Conclusions without proper amount of study should never be made.

Any old farmer that does not understand the laws of heredity

in stock raising is a back number and is the man who is raising the slab-sided hogs. But the man who understands the laws of heredity is the man who is raising the blooded stock.

I remember in looking over some literature that one man made the statement that if he could take men and women who had six fingers and six toes, and have them married to only those who had six fingers and six toes, that he could soon have a generation or a class of people having six very normal appearing fingers. I think that is true.

One of the laws of nature today is that like begets like. If like does not beget like in exactness, defects beget other defects, as Dr. Porter has stated, and as seven or eight of the cases I have cited tonight have shown. Some have shown spina bifida, club foot, deformities of the hip, physical deformities, and mental deformities, and when you have these defects they are much more liable to beget such defects.

Before closing I wish to say that if we give these cases more careful study in looking up the family history, in studying the mentality and the physical condition of the parents, and especially the mother of such children as these, we would in the future be able to refer cases with a history that is complete, much more than I have found in the literature read. That, to my mind, is the most important thing in my paper tonight, because I believe that if we will properly go about this subject we can soon arrive at some conclusions in regard to the etiology that are now in the dark.

Dr. G. E. Johnson (closing discussion): I am very glad that Dr. Porter expressed interest on the freshening of the edges. I merely made that as a suggestion; but I earnestly and honestly feel that there is no traumatism in abrading the surface with a very coarse carborundum wheel, yet I only made that as a suggestion. I said at the time that I had not tried it, but I think it is worthy of a trial. Of course, I do not mean to run the carborundum wheel two, three, four or five thousand revolutions per minute to produce heat, but at a reasonable speed. I have noticed abrading the surface of the mouth by accidental touch to the gums and the mucous membrane. It takes but a touch of the wheel until the surface is abraded of its epithelium.

It just occurred to me that in preparing those surfaces that that would be a means of removing a minimum amount of tissue.

HOW TO FILL TEETH WITH GOLD.

Owing to circumstances over which the editorial department had no control the paper by Dr. J. V. Conzett, next in his series under the above title, could not appear in this issue. It will, however, be ready in ample time for publication in the January, 1909, issue.

Digests.

CONSERVATISM AS AN IDEAL IN BRIDGEWORK RESTORATIONS. By Fred A. Peeso, D.D.S., Philadelphia, Pa. I feel but little competent to deal adequately with the subject assigned to me—a subject of such great and vital importance, not only to the profession at large, but to the general public as well, to whom it is really of more vital significance than it is to ourselves.

Although I have worked and studied in this department of dental prosthesis for upward of a quarter of a century, nevertheless the conviction is more and more intensified in my mind that the unexplored regions of this subject are still greater than the whole territory which has been covered by the achievements of the present.

There are times when I feel completely discouraged by the realization of how little we really know and how much there is yet to be learned in this one branch. We are still working, as it were, in the early dawn, if not in the dark, and it is only by the hardest work and most earnest endeavor that we can hope to improve and advance the results of our efforts to anything merely approaching perfection.

Crown and bridge work is a comparatively new addition to our professional activities. It is barely thirty years since it first demanded serious consideration, and for many years following it was frowned upon by the better members of the profession.

Unfortunately, at the beginning a large number of unprincipled practitioners saw in it a new source of revenue which they im-

mediately proceeded to utilize, placing bridgework anywhere and everywhere, the only restriction to their operations being the inability of the patient to produce the necessary collateral.

Then, too, there were some really honest men who, carried away by the new idea and wishing to benefit their patients and perpetuate their names, did this work in ignorance of the relations of the mechanical stress involved and of the ability of the different teeth used as abutments to do the work imposed, with the result that the work became worthless after a short time.

This still further degraded this new art in the minds of the ethical dentists and of a large proportion of the more intelligent patients, to many of whom the mere knowledge of the fact that a dentist would advise bridgework was sufficient to stigmatize him with the suspicion of quackery.

A few of the better men had visions of great possibilities for the future of this work, and it is to their labor and their efforts that we are today indebted for the legitimate survival of one of the most important branches of dentistry.

There seems to be a natural tendency on the part of dentists to be over-enthusiastic over the advent of a new, or the resurrection of an old and forgotten, idea or method.

When the use of amalgam was first introduced, the over-enthusiastic dentist hailed it as a panacea for the ravages of caries, under all circumstances and conditions. It was placed in cavities anywhere and everywhere. Perfect gold fillings were removed and in many instances all the fillings in a mouth were taken out and replaced with amalgam. This amalgam consisted of silver coin filed away, these filings being mixed with mercury. It was known as "Royal Mineral Succedaneum." Very little or nothing was known of amalgam, its manipulation, or its properties. The dentists simply knew that these silver filings mixed with mercury made a plastic mass that could be pressed into a cavity like putty, which, when left to itself, became hard. As to whether it would shrink or expand, whether it would disintegrate readily, or as to what effect it might have on the tooth itself, little thought was given—and many practitioners cared nothing at all as long as the result brought them money.

With the introduction of vulcanite we had an analagous condition of affairs. While in itself of inestimable value to the pro-

fession, the introduction of vulcanite was in a way a great blow to high-class prosthesis, one from which the dental profession has never fully recovered. The delicate skill and manipulative ability which had been requisite in the making of metal dentures was not considered necessary in the use of vulcanite, and from skilled craftsmen many degenerated into mere workers in plastics, and became the medium through which quackery and incompetence expressed itself, to the great damage of prosthetic art and to the detriment of dentistry in the public estimation.

Still later came the porcelain fillings or inlays, which were preceded by glass fillings. Many of you have probably spent time in powdering in a mortar differently colored bits of glass with which to experiment on these fillings.

The advent of the porcelain inlays was hailed with the same enthusiasm as the "Royal Mineral Succedaneum" had been, and it was in many instances followed with the same disastrous results. Gold was removed to give place to the porcelain inlay and many teeth were ruined.

The last of these innovations is the system of cast gold inlays and gold castings generally, while innumerable casting machines have been placed on the market, until it seems that the dentist who does not have some kind of original casting machine to sell is a sort of freak.

To quote the saying of an eminent sociologist in reference to another matter, "They have bred like wolves in a famine-stricken land."

This last idea of cast gold inlays is the most valuable of all that we have received for many years, and all honor is due to Dr. Taggart of Chicago, who has spent so many of the best years of his life in working out and bringing to perfection a method which will prove of such inestimable value to the profession. But even this method cannot escape the inevitable fate of all new ideas; it must first be run to the ground and killed. It will go through the same course as amalgam, porcelain, etc. It will be used everywhere to the detriment of the patient; but, like water, it will find its level, and then we shall more fully realize what a boon it is to both dentist and patient, and the name of Dr. Taggart will in years to come be revered as that of a benefactor to his profession.

It is crown and bridge work, however, with which we have to deal, and I shall endeavor to confine myself to my subject.

I have touched but lightly on its early history. It is only within a comparatively few years that crown and bridge work has been generally taken up, and at the present time its value as a most important factor is recognized by nearly every dentist.

It has passed through the fad stage, but, alas! it has not yet reached the point where it is a universal blessing to humanity—in fact, I really believe that it is directly the opposite, and that more harm than good is done by its use.

This is largely due to the mercenary spirit of practitioners, who are still actuated only by the motive to get all they can from their patients, caring nothing at all as to whether the patient is benefited or not. There are also many failures among the honest practitioners, due almost wholly to their lack of knowledge and of understanding of the principles involved.

There is hardly any branch of dentistry which is so little understood at the present time as is crown and bridge work. It is one that requires a most careful and thorough study, and consideration of all existing conditions. Everything must be considered, and nothing left to chance. Not only local conditions, but the general condition of the patient, must be studied as well.

If the teeth are loose, why are they so? and can they, by proper treatment, be brought to a firm and healthy state? Is there any systemic condition which would predispose the patient to pyorrhea or to any disease which might affect the teeth? If the teeth are abscessed or diseased in any way, they must first be brought to a healthy condition before we proceed with the mechanical part of the work.

Number, Position and Condition of Abutments.—In building a bridge over a river, the number, position and condition of the abutments are vital points for the life of the structure. If the abutments are built on an insecure foundation the structure will fall. If the foundation be all right, and the abutments are made to support one hundred tons, trouble is sure to arise if one thousand tons of weight be placed on the bridge. The same will happen if the number of abutments be insufficient; the whole work is wasted.

The same conditions apply to bridge-building operations in the

mouth. The foundations must be perfect and proportioned to the stress which the bridge, when being used, imposes upon them, else you will see the structure collapse.

It does not make any difference how skilfully or how beautifully the prosthetic part of the work is done, the success of bridgework depends upon the fundamental preparation of the mouth.

Relative Strength of Teeth.—The relative strength of the different teeth must also be considered. The cuspids and molars are the strongest and form the best abutments, but we cannot put the same amount of stress upon laterals, centrals or bicuspids, although these teeth will do their proportionate share of the work.

A tooth properly treated will do far more work than it was originally intended to do, but we must not expect too much, or we shall regret it.

Two roots of equal stability used as abutments of a properly constructed bridge will successfully resist twice the stress of mastication which either root can bear individually, and when we come to multiply abutments the ratio in which these combinations of abutments resist the stress of mastication seems to increase proportionately.

Articulation is also of the greatest importance. The abutments of a bridge which otherwise might have lasted for many years may be completely ruined in a short time by a faulty occlusion.

The stress of mastication, which in some mouths is far greater than in others, must also be considered.

The shape of the arch, too, has a great deal to do with the lasting qualities of a bridge. A bridge in one mouth might last for years, while in another mouth, with exactly the same abutments and in equally good condition, but with a differently shaped arch, to place a bridge would be wholly inadvisable.

The fact that a bridge in contemplation would occlude with a plate would have a bearing on the utility of the work.

All of these things, and many more, must be conscientiously studied by the man who honestly desires to do the very best for his patients.

The lack of that success toward which all of us are striving is largely due to the lack of training in the fundamental principles. We must get at the root of things. We must understand the engineering principles upon which successful bridgework is of neces-

sity founded, and be willing to study and work hard if we ever hope even to approach the ideal. Even then there may be failures, but if we are honest at all times, such failures will be progressively fewer.

We cannot guarantee the success of our operations—nor have we any right to do so, any more than a physician can guarantee a cure; but if we have conscientiously studied our cases and have done the work to the very best of our ability, we shall at least have a clear conscience, even though our efforts may not have been crowned with success.

As I have said before, the success of bridgework depends primarily upon the preparation of the mouth, and of this preparation the shaping of the teeth and the fitting of the bands is a most important part. The lack of preparation and the subsequent evil results have been forced upon me many times. The teeth must be prepared so that the bands will hug the root at the neck tightly and cause no gingival irritation. If this be done, the chances of successful results in our efforts are very favorable, but if the preparation be faulty we have no one but ourselves to blame for our failures.

It is astonishing how much abuse the pericemental membrane will tolerate in some mouths and how little in others. Let me cite an illustration: A full upper bridge was placed in the mouth of a Chilian in May or June. In the lower right jaw the first molar and second bicuspid were missing, the first bicuspid and second molar being in position. The molar was slightly decayed, but was perfectly firm in its socket. The patient was obliged to leave the city and could not wait until the work was completed, so it was deferred until fall. While away the tooth troubled him slightly, and he thought he would have it crowned temporarily in order to keep it in good condition until the bridge was made later.

In October the patient returned to the city, and a most sorry condition of affairs existed. There had been practically no trimming of the tooth, the band had been forced over it, cutting into the gum and causing irritation and inflammation extending to the pericementum. The tooth was literally floating in pus, so that it was easily lifted out with the fingers. This result was entirely due to lack of preparation.

Another case, showing the opposite result, was as follows: The

patient, an English lady, applied for treatment within the past few months. On her upper left first bicuspid a badly made gold shell crown had been fitted, which it was necessary to replace with another. On removing the crown it was found that the tooth had been trimmed very little, if at all. The band was impinging on the gum, which showed irritation.

On removing the crown it was found that the pulp-chamber had been opened and packed with cotton. There was a large perforation above the floor between the two roots. The pulps in both the buccal and lingual canals were alive and seemingly healthy. Notwithstanding these conditions, which had existed for three years, the root was quite firm. In most mouths a tooth treated as badly as this would have been lost after a few months at the longest.

Therapeutic Value of Bridgework.—Aside from the restoration of the masticatory functions by properly made bridges and from the improvement of the patient's general health, the local therapeutic effect of the work upon loosened and diseased teeth is at times wonderful. Many times teeth which have become loosened from some cause, such as malocclusion, from being without an antagonist, from carrying improperly designed bridgework, from gingival irritation, etc., can be rendered perfectly firm by giving them work to do in carrying a properly designed and executed bridge.

Do not give up a tooth until you have exhausted every effort to save it!

One of the most remarkable cases of recuperation that I have observed was the following: The patient was a lady about forty years of age, whose teeth had been neglected; it was found necessary to place four bridges in her mouth. In the upper left jaw there was a very loose cuspid root which had been improperly crowned, the crown had been lost for some time and the root had broken and decayed away to nearly one-eighth of an inch above the gum, which was in a highly inflamed condition. In order to place a satisfactory bridge it was necessary to save the root if possible.

The gum was pushed away and with difficulty a band was fitted to it. The root was so loose that in fitting the band a sharp-pointed instrument had to be passed up over and beyond

it and stuck into the side of the root to prevent it from being pulled out while removing the band. A removable bridge was anchored to this and a molar, the band of the cuspid being nearly three-sixteenths of an inch deep, so as to bring it to the edge of the gum. The bridge was cemented in place, there being a space of about one-eighth of an inch between the face of the root and the floor of the cap filled with cement, the depth of the band making the facing short. This work was done a little over two years ago. The following fall the patient returned and the condition of the mouth was found to be most satisfactory. The cuspid root had become nearly as firm as any tooth in the mouth. The irritation had entirely subsided and the gums were perfectly healthy, but the reduction of the inflammation had left the band exposed about one-eighth of an inch or nearly to the face of the root. This was unsightly, therefore it was removed, and another band and crown, with a longer facing, was made and attached to the bridge, greatly improving the appearance. I saw the patient again about the first of July, when the mouth was in a perfectly healthy condition and the cuspid root as firm as any of the other teeth. This was a most unpromising case, but the result shows what can be done at times, even under the most adverse conditions.

I have mentioned these few cases to illustrate extreme conditions which we may at times be called upon to treat and which we must treat to the best of our ability.

Sometimes we will be called upon to do some work against our judgment, as, for instance, when a patient, having an insufficient number of roots for a lasting bridge, is willing to resort to any expedient which will put off the wearing of a plate. In such an instance the dentist might take chances that he would not take otherwise, but he should have a perfect understanding with his patient as to his position regarding the durability of the work.

Bridgework unquestionably has proved to be a blessing to humanity—to both patients and dentists. To the profession it has been of inestimable value in that it has counteracted, to a great extent, the effects brought about by the use of vulcanite; for we are again becoming skilled in the working of precious metals, which for a time seemed a lost art, and today there are probably

as many or more skilful gold workers among the dentists than there were before.

Bridgework must be regarded as a conservative measure, where it is indicated and when the work is properly done it is the very best thing a dentist can do for his patient and nothing can fill its place, but in the reverse conditions it is the very worst thing and nothing will ruin the mouth so quickly.

We must be conservative in all our dealings and our operations and this we shall be if we are perfectly honest with ourselves, but there will always be dishonest men who will do anything if only they receive money for it.

We are all faddists to a certain extent, but we must not carry our fads to extremes. We can feel sympathy or even admriation for the honest and ignorant faddist, but we have only contempt for the dishonest, be he ignorant or wise.—*Dental Cosmos.*

THE CAST INLAY. By W. H. Scherer, D.D.S., Houston, Texas. The dental profession has long been in fruitless search of an ideal filling material, which must possess the inherent qualifications of adaptability, indestructibility, nonconductivity, hardness, absence of shrinkage, harmony of color, and ease of manipulation.

The brilliant intellects of our scientific men have been racked, and their energies expended in their untiring efforts to produce a material in which all of their ideals would be realized.

It has been conceded that no one method or material we now possess will fill the highest requirements under all conditions and circumstances, consequently many means are at the disposal of the operator, to be called into use by the decision of his best judgment in each particular case.

The smaller cavities in the anterior and posterior teeth have been successfully cared for with porcelain, gold and amalgam, but the difficult problem to solve, and the one that has baffled the minds of the most progressive members, has been, what is the best treatment for extensive carious conditions in the crowns of the natural teeth?

Many teeth already containing large fillings demand the attention of the dentist for refilling, in which case the new fillings

are invariably much larger than their predecessors. In brief, badly broken down teeth, where the insertion of a gold filling would not justify the severe nervous strain upon the patient, or the expense of physical energy and nerve force by the operator where temporizing should become obsolete, and where amalgam with its changeable characteristics has proven its treachery; these are the cases that have tried the skill of the operator.

The practice of prematurely subjecting these cases to the prosthetic side of dentistry, ruthlessly destroying the remaining tooth structure, to adorn it with an artificial substitute, the gold crown, or to restore its usefulness with some more modest type of artificial crown, with almost similar disastrous results to the gum tissue, should be abandoned.

It is the sacred duty of every dentist to revere and treasure most highly the remaining tooth structure of every badly broken down tooth, and to spare at almost any cost its untimely sacrifice preparatory to an artificial substitute, and not until this is fully realized will the dental profession be rendering the most good to mankind. Many filling materials are used to preserve the human teeth, and all of them have a distinct place in the practice of dentistry. Gold, amalgam, cement and guttapercha have served us faithfully and well, and still occupy an important position among the dental filling materials. The rubber dam, their accessory to torture, with its corresponding clamps and ligatures, will never be conspicuous by its absence.

Modern dentistry and an ingenious mind have provided a method with an unlimited field of usefulness, especially in the posterior teeth, the one under consideration—the Taggart cast inlay.

I specify Taggart, because the statements I may make regarding the merits of this machine and of the inlays cast by it, cannot be corroborated or produced by any of the spurious imitations or makeshifts which have flooded the market. Buying them is like squandering a fortune in a ten-cent store; when you have finished you still have nothing.

The method of inlaying teeth has survived its days of experiment, thanks to the lion-hearted pioneers in this line, who labored so assiduously. It has bravely borne the harsh criticism inflicted upon it, but while it may be said to be only in its infancy, yet we have the assurance of its filling a place in its own province of

usefulness so admirably that the profession has been compelled to recognize its worth, and its adoption promises to become universal.

These previous statements are broad ones, and I know I am treading on the sacred grounds of the cohesive gold followers, who believe first, last and always in the gold foil filling, and who point to a number of records of fifty years' service for foil fillings; but in their eagerness to stand by an old friend, they fail to state the thousands of just as perfect fillings as the fifty-year-old ones that have not lasted three years—not because they were not mechanically correct, but because of the low grade tooth structure on which the filling was built.

No two substances such as gold and tooth structure can come in actual contact, consequently there is always a chance for capillary attraction to take place; but in the case of the long lived filling, it makes no difference about capillary attraction because the tooth structure is good. In the short lived gold filling, however, the structure is bad, and along with this is a bad environment; and then capillary attraction takes place with disastrous results.

On further recapitulation, the statements in all their boldness can be easily proven.

Before we can successfully and permanently make a gold foil operation, certain conditions are necessary, a few of which I will mention:

1. The patient should be of reasonable age. In the teeth of children, we must be reasonably certain of the development of the apical portion of the tooth, before we are justified in making a gold foil operation of any size, as the jagged end of an undeveloped root will occasionally lacerate the tissues to an extent which may endanger the life of the pulp. In teeth of patients approaching senility, we have diseased and weakened pericemental membrane, also physical condition of the patient is opposed to long, tiresome gold operations. We are then restricted, by virtue of the age consideration, to select patients from the date of their attaining maturity until middle life, other ages being deemed doubtful.

2. The cavity should be so located that every part of it is accessible.

The size of the opening of the mouth, the flexibility of the lips

and the position of the teeth in the jaws are the things that must be considered.

The cavity should be so prepared that every part of it may be reached, and the correct line of force applied while condensing the gold.

This limitation is a serious one, and causes us to hesitate before attempting operations beyond the first molar.

3. The cavity walls must be supported by sufficient dentin so that they will withstand the pressure that is necessary to properly condense cohesive gold.

It requires about forty ten-pound blows of a mallet, accompanied by fifteen pounds' hand pressure to each blow to properly condense 1-32 of a sheet of cohesive gold, or 36,000 pressure to the sheet. An ordinary filling in a bicuspid or molar which involves the approximal and occlusal surface requires about five sheets of foil, necessitating the application of about 150,000 of force for its proper condensation.

We must also consider the other phases of our gold operation, the wedging previous to insertion of fillings, polishing of filling, and the laceration of gum tissues and damage inflicted upon the gingival margins; and last but not least, the uncertainty of finished filling having contact point in proper position.

The principles underlying the inlaying of teeth, are in so many respects ideal that it should afford the dentist an opportunity to do more along certain lines than he has ever before been able to accomplish in restoring the natural crowns of teeth to further years of usefulness.

There are several advantages which a cast inlay possesses over any of the mechanically retained gold or amalgam fillings, which I will enumerate.

1. The absolute sealing of cavity against moisture with cement.
2. The binding effect of cement to support anterior teeth.
3. More perfect restoration of contour and contact points.
4. More perfect restoration of occlusal surfaces with fissures and cusps.
5. Greater compatibility.
6. Less conductivity of thermal changes.
7. Time and discomfort saved to patient.
8. More general application with permanence.

Elaborating upon these advantages I will say:

1. The absolute sealing of a cavity with cement used in connection with an inlay gives an inlay for that reason greater immunity to recurrent caries. With a mechanically retained filling, the question is one of adaptation to cavity walls and not adhesion.

When an inlayed filling is made to perfectly fit the cavity, and is properly cemented to place, the cavity is so sealed that a leaky condition such as occurs around an ordinary metal filling is impossible.

My opponents may challenge this statement, but the slight dissolution of the cement line has never been found to be a serious element in the life of the inlay. As it only dissolves to a depth equal to the width of the line, consequently it does not leave exposed any vulnerable point, and no leakage can take place under the inlay, as capillary attraction as a force has ceased. But in a gold foil filling, this same amount of defective margin would be fatal to the life of the filling. This explains one of the principal reasons why inlayed fillings are less subject to recurrent caries.

2. The binding effect of cement to support anterior teeth is certainly an advantage. The cement adds strength to the weakened tooth structure, while a mechanically retained filling alone diminishes it.

3. The more perfect restoration of contour and contact points may be accomplished, as any desired contour may be obtained, and the polishing of the inlay being done out of the mouth, the inlays are set with positive and certain contact. This is a most important factor, for what is more annoying to a patient than a filling with a poor contact? Bad proximal contact is, as we all know, one of the predisposed causes of recurrent caries.

4. The more perfect reproduction of occlusal surface is possible, because the patient has bitten on the wax in all directions, thus closely imitating the natural contour.

5. Greater compatibility occurs because undercuts are not made in sensitive and vital tooth structure, also because the tooth is not subjected to any shock from long continued malleting.

6. Less conductivity of thermal changes is due to the immediate cement lining, which, though only a slight film, breaks up the conduction of the thermal changes.

7. The time and discomfort saved the patient is one of its

greatest advantages. The pain and discomfort the patient is saved from the preparing of deep retaining grooves and undercuts; the usual long, tedious malleting, which also exhausts the operator's strength—a much-needed asset in this day of twentieth-century strenuousness; the subsequent polishing of proximal surfaces, with the much-despised strips, disks and polishing files, etc., is surely a most decided advantage, as this has been eliminated in inlay work. The inlay method stands without a rival as a humanitarian method of filling teeth.

8. By the more general application of permanency, I mean that it is possible to make inlays in cavities that would practically be impossible to fill perfectly with gold plugged in piece by piece, on account of the difficulty of keeping cavities dry. Chalky enamel margins, which suffer from the malleting of the gold, hypersensitive cavities, where necessary cutting for retention is impossible, and in the teeth of children where permanent operations are desired. It is a significant fact that inlays are tabooed mostly by those having little, if any, real knowledge of the art, or by those who, by following methods which are based upon unsound principles, have made failures, and in consequence fell justified in condemning the method as worthless instead of endeavoring to fathom the cause of the failure, and when found, applying the remedy.

One of the greatest causes of failure lies in the indifference in the operation of cementation, and in depending upon the adhesion of the cement to retain the inlays in position. So firm am I in this belief, that I have no hesitancy in saying that the sooner the dental profession in general begins to realize this fact—that the adhesion of the cement unassisted will not retain inlays in position—the sooner will inlay work attain the prominence to which it is justly entitled.

The process of making a cast inlay is as follows: After the cavity is prepared, a piece of the special wax is softened in water at a temperature of about 140 degrees; avoid working the wax, as it will not unite after being separated without melting it. Press a generous piece into the wet cavity with the fingers, instruct the patient to bite in any and all directions as in mastication. This gives an imprint of the opposing cusps in the wax. The wax is now raised out of the cavity just enough to unseat it, and show

that it is not sticking to the cavity. At this stage the wax is chilled with ordinary hydrant water, and the excess wax is trimmed away. Always during the shaping process be sure to keep the wax at an easily workable temperature.

Make your wax inlay the exact shape you want your finished gold filling to be. Any artistic efforts put on the wax at this stage will save time in the end, because the wax is more easily carved than the gold, and by carving it with instruments lubricated with perfumed vaselin, and by the use of a pellet of cotton, very smooth surfaces may be obtained.

We now have a perfect wax inlay made of a material that contains no foreign substances. Into this wax inlay a sprue wire is set by warming it sufficiently to melt the wax. The wax inlay, with its sprue attached, is now set in the lid of the flask, which is also a crucible mold.

The inlay is then completely imbedded in a special investing material, and when this is hardened the lid is removed from the flask, the sprue coming with it, which now leaves a crucible with a hole leading to the wax inlay. The flask is put over a flame, and slowly heated up, the wax being absorbed into the investing material, and leaves a mold the exact shape of the wax inlay. The flask is now put into the molding machine, which has a nitrous oxid blowpipe flame for melting the gold, and a compressed air attachment for forcing the liquid gold into the mold under pressure.

The nitrous oxid flame is almost a necessity, as it is only by this flame that the gold can be made liquid enough to cast and cool without shrinking.

When the nitrous oxid flame has heated the gold much beyond its melting point, the lever is quickly brought down, the flame is automatically switched away, and the compressed air is automatically thrown on top of the liquid gold, which, of course, must go into the mold under pressure.

The actual time consumed in forcing the melted metal into the air-tight mold under pressure is probably but a fraction of a second, but the success of the whole process depends upon this speed.

The Taggart machine takes advantage of every fraction of a second. Having the pressure on top with no possibility for the gold or air to escape, the liquid or boiling gold is forced into the

matrix while it is in this molten condition; the pressure is maintained for a few moments in order to allow the gold to thoroughly congeal.

This continued pressure prevents the gold from contracting, or the amount of expansion is equal to it; at any rate, the inlay is a perfect fit.

It has been suggested that the inlay being composed of pure gold, there is less expansion and contraction than with lower-grade metals, which may be true in a measure, but there must be some other reason, for we know that the coefficient of expansion and contraction is different in each metal.

Dr. Taggart's theory is this: The molten molecules of metal are forcibly thrown into the mold and held there, and consequently are not allowed to arrange themselves as they would do if not under pressure.

This is not a careless man's process. An average man, if he will obey instructions to the letter, and not allow his own ideas to creep in, can make more perfect fillings than he ever made with foil, while the naturally gifted operator will make more beautiful inlays than he ever dreamed of.

The introduction of Dr. Taggart's gold inlay, and the instrument for producing it, removes the last barrier to the fortifications of that vast army of gold foil Knights; and they must surrender and take up arms in defense of the new King, to whom they will swear allegiance; and if under him they are courageous and zealous as under the old, we may hope to draw near, and possibly surmount or destroy the last wall which conceals from the world the ideal gold filling where it is indicated.

Had Dr. Taggart done nothing else than evolve a system of scientific mechanics whereby we can make a perfect-fitting inlay, he would have attained eternal fame; but the possibilities are unlimited. It is possible by this wonderful method to cast prosthetic pieces with equal accuracy.

It is prophesied that the bridgework of the future will largely be composed of cast bases carrying pinless teeth which are cemented to place, thus making repairs easy.

By carefully heating the investment, the gold can be cast directly against the porcelain, but more esthetic and practical re-

sults are obtained by making the dummies of the all-porcelain crowns, as the Davis, Justi, White and Brewster, assembling them, and casting the base in clasp metal, which makes a stiff frame with a minimum amount of gold. Artistic and mechanically correct crowns can be made as well as a perfect-fitting all porcelain crown, by making the joint between the root and crown with wax and casting.

The die and counter die for plate work, especially partial cases, will soon be a thing of the past, as partial and full dentures can be accurately cast in less time than it would take to make a vulcanite base for the same plate.

Perfect-fitting clasps can be made in a few seconds. In fact, gentlemen, there seems to be no end to the application of casting precious metals for dental uses, except the limitations of the dentist himself.

As a result of Dr. Taggart's true American genius, coupled with his indomitable energy and determination, dentistry has received one of its greatest gifts. We owe him an everlasting debt of gratitude, which should be unstinted in its volume.—*Texas Dental Journal.*

A STUDY OF THE TREATMENT OF PULPLESS TEETH. By Wm. Hirschfeld, D.D.S., Paris, France. The art of saving pulpless teeth and making them serviceable for an unlimited time occupies such an important place in modern dentistry that it rightly deserves to be brought up for discussion in professional meetings from time to time. Out of empirical beginnings it has worked its way slowly up to what it is at present and if without doubt the last word in this line has not been said, if there are questions which still need to be solved, the fact remains that we have such methods, such medical or chemical agents at our command as to overcome with their help almost any complication. We must admit even that within the last ten years so many new methods have come up that a confusion in regard to their suitable employment is nothing to be astonished at. It may, therefore, be of interest even to you, the long experienced practitioners, to select through this study those methods or drugs which in their ensemble may form a rational treatment of pulpless teeth.

To comprehend clearly the object of this operation, let us find

out first what Nature demands from us to tolerate a pulpless tooth in the mouth. This may be expressed in a few words:

To do away absolutely with anything liable to create infection in the immediate neighborhood of the tooth, or, in other words, to keep up a constant aseptic condition of the pericementum.

We can accomplish this under two conditions:

First: By the removal of the cause of infection, which means here the remnants of a dead pulp.

Second: By the hermetic sealing of the door open to aseptic infiltration; namely, the foramen of the root.

Before commencing the treatment of a pulpless tooth we have first to examine the actual state of the pulp and our diagnosis will enable us to make a distinct difference between two classes of diseased teeth:

1. Teeth devitalized purposely, or teeth taken before decomposition of the pulp mass has set in.

2. Teeth where the pulp has undergone putrefaction through an accidental cause.

While the final treatment, the filling of the root of both these classes of teeth will be the same, the preparatory part, the removal of the pulp, will be somewhat different. The more care we devote to this part of the work the surer we can be in our prognosis in regard to permanent success, and I feel like placing at the beginning of this chapter a sentence of the late Professor Miller, who expressed himself in an article on this subject as follows: "In attempting to assign the success or failure of the operations upon diseased teeth to their proper causes, factors of the greatest importance are frequently left out of account and the results ascribed to some agent which may have been entirely different; one of these factors which forms the very foundation of successful root treatment is the manner in which the mechanical cleansing of the canal is carried out."

This mechanical cleansing which Professor Miller laid so much stress on regards altogether the removal of the entire pulp following devitalization which should not present any great difficulty to any operator. Get a free or rather straight access to every canal entrance and with the help of Donaldson broaches, No. 5 (fine and extra fine), the extraction of the pulp may be successfully performed. However, it must be admitted that in narrow roots

this is not altogether easy. The buccal roots of upper molars, the two extreme ends of the bicuspids, the anterior roots of lower molars are generally so fine and above all curved at the end that the tiniest broach will not penetrate to the very apex. Even the most careful operator cannot say with certainty that every particle of pulp has been removed from these narrow canals. To overcome this difficulty the profession has adopted different methods which, however, will not always be accepted by Nature.

The most frequently suggested idea for the removal of tiny pulp-ends is to enlarge narrow canals by drills.

Now, gentlemen, if you reflect for a moment over the consequences of such a procedure, you would certainly condemn forever the use of a drill in a root canal. To enlarge a root you have to cut away from the dentin. These tiny shavings are supposed to be removed entirely by the frequent withdrawal of the drill, the chip blower or the syringe. Now, can you maintain that you really remove every bit of this debris? Is it not sure and certain that fragments of dentin, no matter how fine, will be crowded against the foramen and create there a source of infection? Is there any means to assure the operator beforehand that his drill will go straight to the apex and not leave untouched the curved end of a root?

How inappropriate the idea of enlarging root canals is shows already our view on preparing them for pivoting. Any dentist would consider it criminal to commence the enlarging of a canal before having closed the foramen either by gold, tin, cement or guttapercha. Now, why should there be a difference between the procedure with a narrow root and the preparation of an incisor for pivoting? For all these reasons drilling into a narrow root canal should be discarded as malpractice, although practitioners of good standing, like Dr. George Evans, Hofheinz and others, claim good results with it.

Dr. Hofheinz (1892) advises the enlargement of roots for another reason. According to his opinion, the tubuli of the canal are infected by the dead pulp and should for this reason if no other be cut away.

This theory is not admitted by Professor Miller. In a special article on the decomposition of the contents of dentinal tubuli (1890) he proves that such an infection—if actually existing—will

never be of any clinical harm, provided the pulp be entirely removed. In this paper Professor Miller quotes Dr. Jenkins' view on this matter, who says: "It is my conviction that no inflammation of the pericementum takes place when the pulp has been thoroughly extirpated and the canal, pulp-chamber and crown cavity properly filled. I have never known a case where there was any reason to suspect pericemental inflammation to be caused by the decomposition of the contents of dentinal tubuli. The inflammation could always more reasonably be accounted for, it invariably seeming to be the result of defective manipulation or of pre-existing necrosis." Personally, I must strongly indorse the opinion of these eminent men, as I have never found an abscess following the treatment of a putrid pulp owing to the non-cutting away of the infected dentin. But I have seen frequently sinuses as sequel of enlarged canals and have abandoned the method as positively unsafe. But what are we to do with these troublesome roots?

Are we to follow the advice of Dr. Schields, after whose idea the perfect removal of the pulp-mass should always be performed, no matter if you spend one hour or more over one single root? (1893.)

Here it appears to me that we cannot do better than to adopt the process of mummification as advocated first by Dr. Söderberg of Sydney, Australia, in 1895. His idea is to remove as much as possible of the pulp-tissue and what is left near the apex bring it in contact with a chemical capable of preventing the development of pathologic agents. This he has found in a paste containing alum thymol glycerol mixed with zinc oxid. A few years later this material was improved by the introduction of formaldehyd to increase by it the hardening power of the paste.

Personal experience permits me to say that nowadays such formalin-pastes will positively prevent putrescence of pulp-filaments, as long as we limit its employment to those tiny fragments which we cannot get hold of. To extend the mummifying process over partial or entire pulp, which is frequently done under the scientific name of amputation of the pulp, must be considered as a professional fault, inasmuch as permanent success with this method is, saying the least, doubtful. As a rule, Nature will not tolerate large pulp-remnants and disposes of them simply as for-

eign elements to be eliminated by the usual formation of abscesses.

To leave these pulp-remains simply alone without filling the canal is another largely adopted theory. Dr. Blackstone (1890) after years of successful experience advocates warmly this method, and you are probably all of his opinion that Nature will assist us if we give it a fair chance instead of trying to crowd some gutta-percha on top of these pulp-endings, embedded in tortuous root-canals.

The pulp once completely done away with, the hemorrhage following its extraction, if there is any, should be checked by simple means, mostly by cotton and alcohol. The use of an antiseptic to assist the healing of the wound is not indicated in front teeth, as the free use of phenol, oil of cloves, and, above all, of iodoform, is liable to discolor the teeth. To avoid this unnecessary complication the action of an antiseptic can be replaced by a far more powerful agent—heat.

Heating or even overheating of an empty root-canal should be the next step previous to the filling. The idea of using heat is not new by any means. In reading up articles on root-filling, I have found an excellent paper of Dr. Redfuss (1891), who says: "The thorough drying of the root-canals is one of the most important principles in their treatment, because moisture is a factor in the product of germs and putrefactive processes." Dr. George Evans (1893) is of the same opinion and recommends the use of the electric root-dryer. To increase still more the action of heat, it is well to flood the root-canal with pure alcohol and then heat it thoroughly with a fine copper-point brought to red heat by electricity or (if you have none at your disposal) by heating it over an alcohol flame. The intense heating of the canal will at the same time facilitate the intimate adherence of the filling material to the walls of the dentin.

The question, concerning the most suitable root-filling which we have to consider now, has induced a good many writers to publish special articles during the past thirty years and in each a different material is advised. This vast divergency of opinions can be considered as the result of the erroneous, but for a long time accepted, theory that the welfare of a pulpless tooth depends on a curative action of the material in the canal. This—to a certain degree—may be the case with teeth having their foramen enlarged through pathologic processes, but with a normal healthy

root, entirely free from pulp tissue, I can only agree with Professor Sachs of Berlin, when he says in his book on filling teeth: "It matters not so much what you put into a root-canal as what you take out of it." Indeed, the kind of filling employed is of but little importance provided it is non-irritant, of easy manipulation and impermeable to moisture. These qualities a great number of materials possess, more or less, and if their advocates have all been successful with them, their success hinges perhaps more upon the skill of the operator than the quality of the filling used. Going through the literature on this subject, I have found in the *Dental Cosmos* of 1890 an excellent paper of Dr. Faught of Philadelphia. This author, by that time, had studied up eighty different writers on root-filling in their articles published from 1874-1888. Their advice is the following: Twenty-one are for zinc oxychlorid, 16 for gold and guttapercha, 11 for medicated cotton, 6 for wood, 3 for zinc oxyphosphate, 1 for shellac, 1 for lead, 1 for leaving the canals unfilled.

Dr. J. L. Williams, in the discussion following this paper, recommends a very sensible system. He uses tiny rods of lead, zinc, tin or copper, coats them with zinc oxid, allowing the end of these points to reach into the cavity and thus form a retainer for the filling. Dr. Arrington and Dr. Gramm are convinced defenders of beeswax and their view merits a special mention. Although I have never tried their method I can easily understand that a point of beeswax melted inside the canal through locally applied heat can readily penetrate into the finest parts of the foramen and form an excellent sealing there. Dr. Redfuss, in speaking of heat, recommends also beeswax, which he uses at the same time as a vehicle for an antiseptic, mixed right into it.

Following Dr. Faught's example, I have consulted the opinion of the numerous essayists from 1890 to the present time. The majority advocate the use of white guttapercha. Nevertheless, a short note published by Dr. Jenkins in 1903 on the best root-canal filling may impress you as much as it did me. Dr. Jenkins said: "After thirty years of successful experience, that a tooth brought into a healthy condition, having its root perfectly filled with zinc oxychlorid, retains its color and its health and is absolutely destitute of the faintest odor if you cut it open twenty-five years afterward."

Dr. George Evans (1903) is also more in favor of cement, as

he thinks that guttapercha is not as reliable to close heremetically the orifice as cement. His idea is that it does not matter so much for a root-filling to shut the foramen as to be impermeable to moisture coming through the tooth. He holds that in large amalgam fillings, for instance, through the shrinkage, moisture which penetrates will not do any harm to the teeth if the roots are filled solidly with cement or metal. But that he cannot say the same of guttapercha sealings, which he considers as ready to allow infiltration through the canal. Notwithstanding the opinion of these authorities I can only declare that after twenty years of personal experience, guttapercha, reasonably employed, appears to me as perfect a root-filling as we can possibly expect. It is of easy manipulation, therefore ready to penetrate to the fine end of the foramen; it is non-destructible, thus absolutely hindering moisture from entering. It is, as Dr. Barrett says, a neutral material; that is to say, not irritating to the neighborhood of the apex. Of course, red guttapercha should be avoided, as it discolors the tooth; white guttapercha, on the contrary, helps to maintain the color. The best way to employ it is to use it previously dipped in liquid chloropercha. In place of it. eucalyptol was recommended to me only lately as being of greater advantage, as this remedy, aside from its antiseptic properties, brings the guttapercha point to a more intimate adherence of the dentin than chloropercha, which, after the evaporation of the chloroform, is apt to leave an empty space around the point.

It is for this same reason that a number of operators first line the canal with thin cement and finish up with a guttapercha point pushed into it and allow to harden with it.

The principal objection against this idea is that possible pressure produced by the guttapercha may not be as readily done away with as with the chloroform, which instantly softens the end of the guttapercha near the apex. This question of pressure on the foramen has to be taken into special consideration in regard to immediate root-filling.

As a rule, a filling pressed right away into an absolutely empty canal will never do any harm, but forced against remnants of the pulp we may have pathologic symptoms follow our operations. It is on this account that after the extraction of pulps under local anesthesia immediate root-filling should be avoided, as the momen-

tary absence of sensitiveness might possibly induce you to believe that every particle of pulp is gone, which to be certain of you can only know at a subsequent sitting.

Another reason against immediate root-filling is the idea to give nature a rest after even the slightest irritation of the periosteum following the application of arsenic trioxid. And finally abundant hemorrhage may oblige us to wait before definite filling. We cannot always check bleeding at once, and from twenty-four to forty-eight hours' interval is sometimes insufficient to touch the foramen without setting the pulp-end to bleed again.

All these arguments are perfectly good. All the same, long experience has proved that as a general rule, immediate filling of a healthy root will not produce any further complication.

In conclusion, we can resume the different phases of treating purposely devitalized teeth as follows:

Removal of the entire pulp in normal roots;

Application of heat as germicide;

Filling of the canal with white guttapercha;

Remnants of the pulp in tortuous narrow roots should be either left alone or mummified by the application of formalin paste.

The conditions are different where actual decomposition has followed the death of the pulp, as then its mass is changed into an altogether new body.

A devitalized pulp remains, at least for a certain period, perfectly harmless. In this state it simply needs to be extirpated within given limits of time, while a putrescent pulp forms through the influence of microorganism a new body, always ready to extend infection to its immediate surrounding. It is thus perfectly comprehensible that the removal of a putrescent pulp demands from us precautions which the simply devitalized pulp does not require. Although it may sound somewhat paradoxical, one must admit that the treatment of an infected pulp is perhaps a more delicate and complicated operation than the healing of a tooth with a blind or an open abscess. In these cases the harm is done, while with the others, pathologic consequences can be brought on through our manipulation.

The desire to remove putrescent pulps with less danger for the pericementum has therefore been the preoccupation of many investigators who tried to solve the following problem: To change

through the influence of some chemical the entire composition of a decomposed pulp into a perfectly innocuous body. Inasmuch as the solution of this problem is altogether a scientific one, it is fair to suppose that only such men have arrived at positive results who have studied systematically the pathology of the pulp in its different stages of decay.

The first dentist who, to my knowledge, has opened the door to a regular scientific treatment was Dr. Schreier of Vienna, who, in 1893, presented to the profession his well-known method of mixing the infected pulp-débris with sodium and potassium, forming through this union a new body like in its ingredients to soap.

A few years later, in 1897, Dr. Weld presented another system of making aseptic the putrescent contents of the root-canal under the name of the chemico-metallic method. It consists in the introduction in the root of a zinc-point alloyed with silver and the application of a drop of modified nitro-hydrochloric acid. Through the union of these elements the root-canal is chemically disinfected and an oxid formed which involves the metal and serves as a permanent root-filling and sterilizer.

Dr. P. Jones, who read a paper on this treatment in 1903, praises it as especially suitable for tortuous and putrescent roots. If we can take the success of this method as granted, may I venture as a personal suggestion to extend it on broaches accidentally broken in root-canals? These little mishaps which can occur to the best operator may find a good solution with Dr. Weld's theory: Why not try to render these broach-ends harmless by uniting them with a chemical ready to neutralize the bad effect of the action of steel on decomposed pulp-remnants? Practitioners, especially those familiar with the laws of physiology and chemistry, will possibly attain a good result concerning this problem. At any rate, we are greatly indebted to Dr. Weld and his name deserves to be mentioned with those of Heizmann, Redfuss, Kirk, Harlan, Guilford, Boedecker, Miller, Black, Williams, Frey, Choquet, A. Witzel and others, who, through their serious scientific investigations, have helped to advance the cure of diseased pulps during the past twenty-five years.

The uncertainty in regard to the treatment of infected pulps was brought suddenly to an end by the revelation of Dr. Buckley of Chicago, whose discoveries on the employment of tricresol-

formalin for putrescent pulps may be safely accepted as a positive solution of the question. As this remedy has become of current use in our daily practice, as probably you all have read the articles published by Dr. Buckley on this line since the International Congress of St. Louis, it may seem superfluous to explain this method in its details. Suffice to say, that his patient and minute researches have thrown such a brilliant light on the different phases of decomposition of the pulp that the employment of tricresol-formalin for changing the dangerous character of dead pulp-residue appears today as a perfectly natural operation.

But still, this study would be incomplete if the different stages of pulp-decomposition, with their sequels, should not be at least mentioned. Allow me then to consider them briefly in their principal features.

1. The pulp is simply decomposed without pain.

Application of Buckley's remedy, sealed hermetically in the tooth, and left in for twenty-four hours. The second day only removal of the pulp with broaches, dipped frequently in formalin and another application of the mixture for a day. If there is no sensitiveness and no bad odor by that time, the tooth can be filled definitely.

2. The decomposition of the pulp has produced suppuration, which oozes out of the canal on pressure, in fact, what is known as "blind abscess."

Here he advises removal of the pus as far as possible by pressure on the gums; then a dressing of the preparation hermetically sealed in for a day. This, repeated for two or three times, will bring the suppuration to an end. If finally the pus changes into a clear serum, this is best dried up as much as possible and definite filling without fear of future trouble proceeded to at once.

3. Putrescent pulp with sinus.

Here first clear out the sinus opening as far as feasible and then force a diluted preparation of Buckley's liquid through the tooth.* Cauterize the sinus through the gums with a strong solution of an equal mixture of phenol and sulphuric acid. Seal hermetically into the root a tricresol-formalin dressing. After

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NOTICE.—If what is meant here is to force cresol-formalin through the canal and sinus the author is not following Dr. Buckley's teaching.—Ed. DIGEST.

twenty-four hours the pus-formation will cease and granulation be formed which definitely closes up the sinus opening.

With these short indications, the experienced dentist is bound to meet all possible cases of putrescent pulp, and there would be nothing left to add if these pathologic processes would not produce very often a consequence known as open or enlarged foramen, requiring a special treatment.

The foramen of a healthy root is generally so fine that our filling materials, like cements or guttapercha, will not penetrate through it. But after abscesses we find this opening sometimes so much enlarged that a broach will readily pass. If that is the case, the fine ending of a guttapercha point may possibly be pushed beyond the root and create irritation. This consideration has led the way to find a material as a root-filling which, even in contact with the periosteum or the alveolus, will not act as an irritant, but, on the contrary, develop a healing action. These properties we find particularly existing with lead. The well-known fact that bullets may remain any length of time in the human body without creating noticeable disturbances has induced dentists to employ lead in a similar way.

I cannot trace the first discoverer of this method, but in 1890 Dr. Norman Kingsley was said to have used points as a root-filling for the last thirty years. Among modern writers, Dr. John Spaulding has presented at Basle (1904) further details on lead-points, which he advised for any lesion involving the inside of the root.

More recently, Dr. Frank Day's successful experiments have not only confirmed Dr. Spaulding's views, but have opened yet a wider field for the use of lead. For similar reasons tinfoil is recommended frequently to close up enlarged foramina. A very good article on this subject was published by Dr. Storer How in 1883, speaking of tinfoil as particularly advantageous for filling the root prior to pivoting. He prefers it to gold for its healing properties. At any rate, gold as a filling for root-canals can be safely regarded as a thing of the past. Even the best made gold root-filling will not form as sure a protection against moisture as a correctly inserted cement or guttapercha filling. Besides, it must be remembered that gold, driven accidentally beyond the apex, will not easily be tolerated by Nature; it will surely give rise to ab-

scesses and finally cause the loss of the tooth, not saying anything of the difficulty to remove it in case of pericementitis.

Gentlemen, these are the essential principles on which our knowledge to save pulpless teeth is built. Are they powerful enough to enable us to keep such teeth for any length of time? This question cannot be answered positively. Teeth which are treated in a faultless manner, which are absolutely devoid of any pulp-fragments, which are hermetically sealed at the apex, even they may after years and years of comfort give rise to trouble. They may not cause swelling of the soft tissue or abscesses, but they can become the seat of that dreaded complication known as neuralgic pain.

Once in a while patients will consult us, sent by their physician, or some aurist, or oculist, complaining of periodically returning facial sufferings, lasting from one hour to several days. On examination we may be entirely at a loss to find the origin of that pain; there may be no hypogingival decay, no redness or swelling of the gums which leads us to trace the seat of the evil, and still the neuralgia (excepting with abnormally placed third molars) may be caused by a pulpless tooth, showing no evidence of defective treatment whatsoever. As far as I can tell by experience, the upper bicuspids are mostly the originators of such trouble, and this is quite comprehensible when you think of their close relation to the lowest part of the antrum, so easily affected by a pulpless root. In opening these teeth, we may find the roots correctly filled, showing no pus at the apex, and still the pain will cease at once, owing probably to the escape of gas formed at the end of the root. Such teeth can be brought back to comfort by a new treatment followed by the usual sealing of the root. In other cases the pulpless bicuspid may have affected the antrum and brought on suppuration. To be sure of the existence of pus near or inside the antrum a very simple means consists in a careful transillumination of the mouth with a tiny electric lamp; if (after previous shutting away of the daylight) the red translucency of the cheek shows a dark spot near the region of the suspected bicuspid or cuspid, you can diagnose with certainty the presence of pus or of some abnormal growth necessitating the immediate opening of the antrum. These cases are not favorable. Although the pus may be evacuated through the root, a definitive healing with-

out extraction of the tooth is not always sure. Even after sacrificing the tooth a return to health may be long in coming, and only after careful treatment with syringe and drainage.

How can we account for these failures of a root-treatment which we positively know to have been performed without neglecting a single detail?

It simply proves that there is somewhere in our science on root-treatment a weak point, and this may be safely attributed to the peculiar fact that this special work is performed in darkness.

The surgeon, the oculist, the aurist, all have a perfect right to say: "Our operation will be a positive success, inasmuch as we have seen with our eyes what our instrument has done." We dentists are not in the same good position. Have we not to replace our eyes by the touch to find out the condition of the operating field after an extraction of the pulp?

Can we ever get a clear view of the apex and its surroundings after the presumed cure of an abscess with or without a sinus?

Do we see the exact point to which our root-filling penetrates?

This paper has not dealt on the resection of the apex, as Professor Partsh of Breslau advocates it for desperate cases of sinuses; but does this operation not seem to point out to us the necessity of perceiving with our eyes what our instrument is supposed to perform inside the canal? As long as we have to treat roots by (if you like) scientific guesswork, which means to rely on probes, on external symptoms, on past experience alone, just so long will Nature keep the upper hand over us; we will be able to assure comfort to a pulpless tooth for a period of 10, 15, 20 years and more; we will have it in our control to restore health to a pulpless tooth, which Nature tries to eliminate, but our present views on root-treatment do not allow us to say to our patient: Your tooth is safe for the rest of your life! However, this statement has nothing discouraging for us. You have seen in this study that our present knowledge of curing diseased teeth has been built up only little by little, that every detail of this interesting branch of dentistry has been gained through the untiring efforts of eminent men. To discover new points these investigations had to go practically over much trodden ground, and if you reproach this paper for having done likewise, allow me to say to you, gentlemen, it is the only path which leads to improvement, which brings on final perfection.—*Dental Review.*

CAVITY PREPARATION FOR CAST METAL FILLINGS, INLAYS, AND HOODS FOR BRIDGE ABUTMENTS. By Thos. P. Hinman, D.D.S., Atlanta, Ga. The advent of the cast inlay marks a new era in the practice of dentistry. Many operators have become so enthusiastic over its use as to announce the relegation of their gold pluggers to the trash pile, and are inlaying everything in sight, from the pinhead cavity to the largest compound filling. To these men I would say that these instruments

FIG. 1

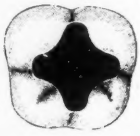
FIG. 2.

still have their place in our armamentarium, and that many teeth are better filled in the old way than by the inlay method. Since I am known as an inlay man, these words may seem strange to my hearers. It is, however, not the purpose of this paper to go into malleted fillings *vs.* inlays, and I will proceed with my subject.

It has been the experience of many operators that a cast-gold inlay which has been made with the utmost care will not properly seat when placed in the cavity. Having had this experience more than once, I began a series of investigations which I think to a

FIG. 3

FIG. 4.



great degree have aided me in eliminating this trouble. I first thought that the investment was at fault, but after satisfying myself on this point I began to look elsewhere for my trouble. After making several casts to fit a carefully prepared cavity, I found that not one of them seated properly. The cavity chosen was a large one in the mesial surface of a bicuspid and was anchored in the coronal surface in the usual way by the use of the dovetail preparation, which is familiar to all. (Fig. 1.) In trying to force the inlay into place I noticed that it was too tight across

the narrowest portion of the neck of the dovetail, and that by grinding the gold away at that point the inlay would seat perfectly. Of course, there must be some cause for this trouble; I therefore began looking for it, and finally came to the conclusion that during the casting process the fluid gold would rub away parts of the investment. The friction being greatest at the narrowest portion of the mold, the investment would be brushed away at that point sufficiently to cause a misfit. This was verified

FIG. 5.

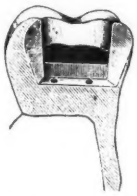


FIG. 6.

by the cavity being modified in such a manner that there was left very little perceptible narrowing in the neck of the dovetail. (Fig. 2.) The angle, where the step is cut, was slightly rounded so as to prevent the molten gold from breaking off this delicate margin. This work of rounding is done with a small cone-shaped gem stone mounted on a mandrel. Inlays made to fit this cavity seated perfectly, and I have therefore adopted the method in my practice, and find that if the cavities are prepared in this manner

FIG. 7.

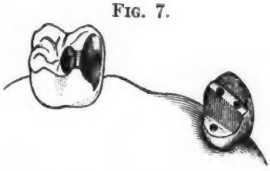


FIG. 8.

the inlay invariably goes to place, provided the proper technique be followed in the other parts of the work.

Cavities in other cases should be prepared so that there will be no sharp corners left in the mold after the wax has been melted. Coronal cavities in molars are prepared as usual with the square-end fissure bur, and then the angles are rounded with a small cone-shaped gem stone mounted on a mandrel. Fig. 3 shows the incorrect and Fig. 4 the correct way. The floor in such cavities

should be made flat, containing as few irregularities as possible, as this will insure a better seating. If the floor has such irregularities the bottom of the inlay should be ground away so as to allow it to seat more perfectly.

Care in Casting Gold.—As the portion of the gold in excess of that required for casting is again used for other cases, this gold should, before casting, be remelted with borax on a soldering block, and the button thereby obtained should be pickled before it is used for another case. The reason for this procedure is that the intense heat used in melting the gold for casting causes oxidation, and also that particles of the investment material cling to the surface. The process of remelting the gold clears it of this deleterious matter and gives us a clear cast. If this be not done the extraneous matter will be forced into the mold, causing an imperfect margin or surface.

Inlays for Bridge Abutments.—Inlays for abutments have become a part of modern crown and bridge work, and as failures have been reported I deem it expedient to say a few words on this subject. I have found that such cases as have come under my observation have been caused by making the inlay too small to withstand the strain put upon it, as well as by improper cavity formation. I have found the use of pins to be of great value in such cases. Let us suppose that we are going to use a molar inlay as an attachment for a bridge. The cavity should be prepared by cutting away the mesial surface of the tooth, freely extending the cavity to the gingival border and broadening it to the buccal and lingual angles; the step and dovetail should be unusually large, so that the resultant inlay may be very strong. The floor or basal wall should be cut flat with a large square-end fissure bur. In the floor two pins are anchored by drilling holes to the depth of about 3-16 of an inch and about ⅛ of an inch apart. These holes should be drilled with a No. 3 bur, and 20-gauge iridioplatinum wire should be used for the pins. (Fig. 5.) The wire should be cut into lengths suitable for the case, and one end flattened by mashing it between a pair of strong pliers; this flattened end extends into the cavity and engages the wax which is used for making the model. (Fig. 6.) Inlays of this character should be cast of 22-karat plate or pure gold to which 10

per cent platinum has been added. Inlays made after this manner will securely hold one end of a bridge of reasonable length.

Casting Hoods.—Hoods for incisors, cuspids and bicuspids may be cast, which somewhat simplifies the construction of this very useful bridge attachment. The cuspid and incisor hood is made by grinding away the lingual surface of the tooth sufficiently to allow space for strength in the finished hood. With a small saucer-shaped corundum stone, No. 11, cut two steps or shoulders on the lingual side of the tooth, one about 1-16 of an inch above the gum line and one about the same distance from the incisal border. In the lower step a hole is drilled with a No. 3 bur for the reception of a pin made of 20-gauge iridioplatinum wire, as heretofore described, and in the mesial step two holes are cut straddling the pulp. (Fig. 7.) These pins with flattened end are then placed into the holes and the wax is forced to place and carved to represent the lingual portion of the tooth. The wax is then withdrawn with the pins attached and the usual procedure of casting is followed. Hoods made after this plan will support one end of a bridge, replacing four teeth or less; they have been used successfully in my practice for over seven years—but I have, of course, only recently cast them.

Bicuspid Hoods.—The tooth for a bicuspid hood is prepared much in the same way as for a compound cavity except that the lingual cusp is cut away, as is also the lingual curvature of the tooth. This surface is tapered slightly toward the coronal surface so that there will be sufficient cope to prevent distortion in the withdrawal of the wax mold. The mesial and distal surfaces are cut away well to the buccal and lingual angles. (Fig. 8.) To make a wax mold for this hood, a piece of German silver band material is drawn around the tooth and soldered so as to make a band to support the wax while it is being pressed to place and carved. The band and wax model are then withdrawn and the wax model removed from the band and replaced on the tooth, where the finishing touches may be put on.

All hoods should be cast of 22-karat plate or pure gold to which 10 per cent platinum has been added. A full description of making these hoods by the burnished matrix method may be obtained from the *Dental Cosmos* for July, 1906, where this method

is fully illustrated and a more detailed account of the cavity preparation is given.

The casting of gold for inlays is only in its infancy, and we are finding out new things about it every day. The greatest difficulty which I have had has been with the investment, and I believe that a perfect investment is yet to be placed on the market. To those interested in this subject I would commend the most admirable paper of Dr. W. A. Price, which appeared in the May issue of the *Items of Interest,* this being the only really scientific article on the subject that has come under my observation.

Everyone using this wonderful process can add something to our fund of information, and I would say to all: "Observe—compare—reflect—record!"—*Dental Cosmos.*

THE LOWER PLATE. By F. G. Worthley, D.D.S., Kansas City, Mo. Among people wearing full artificial dentures it is a fair estimate that nine out of ten had more difficulty in becoming accustomed to the lower than to the upper plate. Fully one-half do not wear the lower plate as constantly as the upper. One out of five does not wear the lower plate at all.

Ask the average practitioner the reason for this and he will answer, "Well, the lower jaw is harder to fit than the upper," which is not the reason at all. The lower jaw is no harder to fit than the upper, but when accurately fitted it is more difficult to retain the fitted plate in position and receive satisfactory service from it than on the upper jaw. It is the purpose of this paper to discuss briefly the reasons for this condition and the methods of overcoming the same.

Broadly speaking, there are two reasons why a plate for the mandible does not retain its place so firmly as for the maxilla. First, the lesser area covered by the plate. Second, the surface form of that area. The lower plate may fit just as accurately as the upper and yet, for the reasons above stated, be much more easily displaced.

In a case recently constructed by the writer the surface area of the upper plate was six square inches and of the lower two and five-eighths square inches. So that, on the basis of adhesion alone, the upper plate had more than double the holding power of the lower. This proportion will approximately hold good in all cases.

In the upper plate the greater part of the adhesion surface (the roof of the mouth) is nearly at right angles to the direction of displacement. Taking cognizance of the known law that the force of adhesion operates most strongly when the displacing stress is exerted at right angles to the plane of the adhering surfaces, it can be readily understood why the upper plate clings with considerable tenacity. On the other hand, the greater portion of the adhesion surface of the lower plate (the sides of the ridge) is nearly parallel with the direction of displacing force. This is especially true in those cases presenting a thin, prominent ridge. And these are the notoriously difficult ones. The entire absence of a ridge also presents a difficulty, for, while the surface is favorable in shape for a good adhesion against stress in an upward direction, the absence of a ridge permits easy lateral displacement by the action of the lips, cheeks and tongue. The most favorable cases are those presenting a broad and slightly flattened ridge, with a considerable area free from muscular attachment.

The chief factor in retaining a lower denture in position, aside from correct adaptation which secures the best possible adhesion, is the assistance derived from the surrounding soft tissues. In a properly constructed plate the tongue, lips and cheeks, instead of pushing the plate from its place, should assist in holding it there. To secure this result, however, certain precautions in taking the impression and shaping the plate are necessary. It might be well at this point to mention the question of weight in the lower plate. While theoretically a heavy lower plate is less easily displaced than a light one, it is a fact that the displacing power of the muscles, operating on an improperly fitted denture, will move it from its place in spite of the greatest weight that can be put into it. While the weight, within reasonable limits, is no disadvantage, it is of much less practical value than has been generally supposed.

The muscular attachments that tend to displace a lower plate are entirely around the outside of the ridge and in the center, immediately under the tongue on the inner side. The height on the ridge of these attachments varies widely in different cases. In not a few the attachment around the outside reaches almost to the summit of the ridge.

In taking the impression an examination is first made to note the extent of these attachments. It will be found that in most cases

the outer rim of the ordinary impression tray is too long. A tray of the proper width should be selected and the rim trimmed at any point required until it will lie on the ridge undisturbed by the lifting of the tongue and cheeks. It is necessary to cut the handle from the tray before this test can be made. There is one place that the tray seldom needs trimming: that is on the inner rim, from about the situation of the cuspid back. There is frequently a fold of tissue in this locality which seems to be attached to the ridge. It can easily be ascertained if this is so by passing the finger down by the side of the ridge. Nearly always there will be found a smooth surface to the ridge, free from any muscular attachment whatever. In such a case the fold of tissue is a help, rather than a hindrance, in retaining a properly shaped plate.

Having secured a tray of the requisite shape, short on the outer rim and in the center of the inner rim and with the posterior portion of the inner rim long, with all the edges that have been trimmed carefully smoothed, the next step is to take the impression. The necessary quantity of softened modeling compound is placed in the tray and introduced into the patient's mouth, the operator standing behind the patient, with the thumbs pressing the tray to place and the first two fingers of each hand engaged beneath the jaw. In this position the tray can be pressed down evenly and firmly. As soon as it is down to place direct the patient to thrust the tongue upward and forward, also to raise the lips and cheeks as though endeavoring to push the tray and material from its place. After the removal of the impression if there appears to be a defective place anywhere on the rim, or any place that appears deficient, a little compound can be added at that point by softening a stick of the same and touching it on as one would build on wax. The rim of the impression may then be slightly softened all round by dry heat and the impression replaced in the mouth, going through the same manipulation with tongue and lips as before. It may be necessary to trim off the surplus compound, soften the edges and replace in the mouth several times before the desired result is obtained. The final test of the accuracy of the impression is to chill it in cold water, place it back in the mouth, and find it fitting so accurately as not to be displaced by the action of the lips and tongue. This result can be reached

in almost every case if sufficient care is taken in following out the method.

If a plaster impression is desired, it is easy, after having carried out the technic above described, to remove a thin layer from the surface of the impression, place a little plaster of proper consistency in it and replace it in the mouth. The writer has been able to secure more satisfactory results without the use of plaster, except in a few cases in which the ridge was so flabby as to be displaced by the compound. A condition not often encountered on the lower jaw.

In constructing the plate certain forms tend to give the most satisfactory results. The outer rim of the plate should extend to the line of muscular attachment, as outlined by the action of the lips and cheeks on the impression, *and no farther.* The inner rim, except in the median line, where it is cut out to accommodate the frenum of the tongue, should extend well down to the floor of the mouth. The surface of the plate on the lingual side, from about the situation of the cuspid backward, should be slightly concave from above downward, instead of convex, as they are frequently made. This leaves a somewhat grooved surface, into which the side of the tongue fits and helps to retain the plate in position. In those cases having a loose fold or roll of tissue along the side of the tongue this groove in the plate should be more pronounced. In many cases a distinct flange may be turned inward toward the tongue at the bottom of the posterior two-thirds of the plate. Over this flange the tissues rest and tend to hold the plate down in place.

Some operators have advocated the placing of a similar flange at the posterior third of the outer rim on the theory that the tissues of the cheek would fold over the same and help in retention. This the writer does not consider good practice as a rule. Generally speaking, it is better to have the outer rim of the plate convex from above downward, just sufficient convexity to restore the desired contour.

Nothing has been said in regard to occlusion, because that is a subject by itself. No amount of careful fitting will prevent the displacement of a badly occluded lower denture.

To sum up: The chief reliance in retaining a lower denture is in adhesion (or suction, if you will) and next, to a proper form

of plate. The adhesion to be secured by an accurate impression, covering only so much of the ridge as is free from muscular attachment.

There is one other point that might be mentioned in conclusion. Some of our older readers will remember an advertisement that appeared in some dental journals several years ago, offering to send, for a stipulated sum, "A method of producing immediate and strong suction in any plate." Those who bit received a package of powdered gum tragacanth, with directions to wet the side of the plate that came next to the tissues and sprinkle some of the powder over it.

Like many other fakes, this one contained a grain of good. It is a good plan, in cases of a lower denture that seems inclined to "jump around" on the least provocation, to give the patient a quantity of the powdered tragacanth with directions for its use. It is of considerable assistance in holding the plate where it belongs while the patient is learning to wear it, and while it is becoming seated and adapted to its proper position.—*Western Dental Journal.*

A CONSIDERATION OF SOME OF THE PRESENT TENDENCIES IN DENTAL PRACTICE. By C. N. Johnson, M.A., L.D.S., D.D.S., Chicago, Ill.—It is sometimes well to study the experience of the past in attempting to form an opinion of the probable results of the tendencies which we see in force today. We do not always learn as we should by experience, and yet, after all, experience is our best teacher. As I look over the developments in dentistry since I entered the profession, I am impressed with the fact that the greatest obstacle in the road to advancement is the constant desire on the part of many in the profession to find an easy way of doing things. I am not inclined to argue in favor of the drudgery practiced by some men in our profession in the past, whereby, for instance, extensive contour operations have been made with gold foil in cases which involved an altogether unreasonable degree of nervous tension on the part of both patient and operator, but I am unwilling to admit that the influence of such operations was wholly bad. In fact, if the development of dentistry along those lines which have contributed most to its permanent advancement be carefully

studied, it will be found that this very kind of work has been an important factor in the case. Men, in order to do the ordinary everyday work of the office to the best advantage and with the greatest ease for themselves and for their patients, must have the latent or reserved ability to do extraordinary work whenever occasion demands; and this ability cannot be gained without painstaking effort nor without much practice in the accomplishment of difficult technical procedures. In other words, the dentist, in order to render the best service for his patients, must be highly endowed with manipulative skill. It follows, then, that anything which detracts from this skill is disadvantageous, and usually any movement or method of practice which has as its motive something short of the highest ideals is to that extent demoralizing.

Holding this view of the case, I am now going to refer to a certain movement in the history of our profession, which at the time of its inception exerted a wide influence, and which, I believe, has not been all for the best. I refer to the so-called New Departure. I approach this question with a full appreciation of the fact that my remarks are likely to be misinterpreted and my motives misunderstood; but I also feel that we are now far enough removed in time from the greatest activity of this movement to give us an adequate perspective for a just and discriminating judgment upon its real merits, and that, if we would reap the greatest good from the lessons which it taught, we must look the issue squarely in the face. I trust it may be possible for me in attempting to do this to also pay a just tribute to the memory of the men who promulgated this movement, because I admire as much as does anyone the pioneers who follow up new lines of thought, and from my inmost heart I revere the memory of every man whose life-work is completed and who has passed to the stage where he can no longer defend his own ideas. It is therefore with the utmost respect for the *personnel* of the men through whose efforts this movement became a prominent factor in dentistry that I proceed to examine its results.

If I have rightly grasped the teachings of the New Departure, the chief object seems to have been to emphasize the virtues of the plastics and to belittle gold as a material for saving teeth.

Most of the argument pertained to the intrinsic merits of the different materials, and I cannot overcome the conviction that much energy was thereby wasted and much harm was done. It is stated quite universally that the New Departure did good by calling attention to the great value of the plastics; and this might have been true had it not been done with an evident attempt to disparage the comparative merits of gold. The impression made on the mind of the profession by that crusade—at least on the minds of those who took the new creed seriously—was that the plastics should be used more and gold less. This was the burden of the song, and it was sung with such vigor and with so many able arguments as an accompaniment that it carried many of the profession by storm.

What was the result? Simply the lowering of the quality of the work done by those who followed the new fad. It had the same effect that the letting down of any high ideal always will have. It furnished an excuse for every lazy or incompetent man in the profession to take short cuts and to plaster holes in teeth. However laudable the purposes of the "New Departure Corps," as they styled themselves, may have been, the ultimate effect of their teaching cannot be disguised.

If the same energy which was spent in urging the virtues of the plastics had been put into a scientific investigation of the physical properties of the various materials, and if the results had been given to the profession, greater good would have been accomplished. The profession, with such accurate knowledge at hand, would then have been able to judge for itself as to where and when to use the plastics to best advantage, instead of blindly following the injunction to use them practically everywhere. Scientific knowledge is never amiss on any of these subjects, but statements based on assumption, as some of these statements were, may be very misleading. And so the effect of the movement which we are now considering was a lowering of the efficiency of the profession by directing it into the use of materials which, by virtue of their physical properties, developed neither the taste of the operator nor his manipulative skill. Better far, it seems to me, would it have been for dentistry, had the slogan gone forth: Nothing yet devised by the ingenuity of man, or

even distilled in the great alchemy of nature, is quite good enough to go into a human tooth! With this as the chief article of their faith, men would have sought for that which was best rather than for that which was easiest. But as it was, virtues were attributed to the plastics which they did not possess, and reflections were cast upon gold which it did not deserve.

In fact, after all the contention over this question of filling materials, and after all the contumely which from time to time has been heaped upon gold, the simple truth remains that not yet in the history of dentistry has there ever been suggested a material or has there ever been devised a method which for stability and permanence of service will equal a well-inserted gold filling. By this I mean a cavity prepared according to correct mechanical principles, with the gold anchored upon sound dentin, with the adaptation perfect and the condensation such that no air-spaces are left between the layers of foil in the filling. In enumerating these requisites I at once hear someone raise the protest that to attain this is in most cases well-night impossible, and that it involves too great a tax on the patient and the operator. No one realizes the exacting nature of gold more than does your essayist, but that it is anywhere near impossible to secure a good technique with it I am unwilling to admit. Too many gold fillings have stood service in teeth for nearly half a century to make the argument valid that gold is such a very difficult material to insert. It has given a record of service that no other material has, and in addition to this—and permit me to say that this is one of the most significant facts connected with its use—it has developed the manual skill of the dentist to a degree which has made him a better manipulator of all filling materials and an operator such as he never would have been without it. This has meant a great deal to the profession in regard to its ability to properly serve the people, and this should always be taken into account when the relative merits of gold are being discussed.

But, with all this, there is a reverse side to the picture—the tension upon the patient, and upon the operator as well, when very large restorations are to be made. This, with the modern nervous organism so highly wrought and so delicately balanced, becomes a very important factor to be reckoned with, and it is

in this connection that inlay work has come as a real benefaction. But it is well for us to pause at the present stage of our inlay enthusiasm and to consider somewhat carefully the probable future of this kind of work. That it has come to stay there can be no manner of doubt. The patients will decide that matter for us whether we will or not, but the thing for us to do is, more calmly than some of us are doing today, to face the real practicability of the inlay as to its permanence and also in comparison with other methods of filling teeth. At the risk of being considered too conservative by many who are firm in their conviction that the inlay is the panacea for all the ills of dentistry, I must affirm that the status of the inlay is not yet established.

It took nearly half a century to determine the real value of gold as a filling material, and we are not yet far enough advanced in the inlay method to have a proper perspective from which to judge. It takes more than a few years to establish the fact of permanence—though the limitations of a process may often be learned in a brief period. In this connection be it said that it did not require many years to demonstrate the fact that porcelain inlays had certain limitations which were inherent in the material itself and which were not sufficiently taken into account by their enthusiastic advocates. If we may judge by our literature and by the reports of practitioners, less than one-half the porcelain inlays are being inserted today that were used three or four years ago. Yet today there is just as clear an indication for their use in given cases as there ever was, and no man can practice dentistry to the highest perfection of his art without using them. It is simply experience that assigns to porcelain inlays their legitimate field, which they will continue to occupy till something more suitable for the purpose is introduced.

Gold inlays promise more than porcelain as far as utility is concerned, because of the difference in the physical properties of the two materials, but that gold inlays should be used to the utter discarding of all foil pluggers, as some are advocating, is only another instance of enthusiasm outstripping reason. It seems so difficult for some members of the profession to adjust a balance-wheel to their judgment when any innovation is introduced into practice, and it is a queer commentary on true conservatism

to see a method which has stood the test of more than fifty years, and which has been one of the chief factors in establishing dentistry on a firm basis, metaphorically swept aside by a mere wave of the hand and relegated to oblivion on account of enthusiasm over a method which has not yet been thoroughly tested.

There is a field for gold inlay work, a most important and apparently a growing one, but not by any means wide enough to displace the materials already in use for filling teeth, and the danger is that harm will be done to a legitimate process by advocating its use where it is not indicated. This was surely the case with porcelain, a material suffering today in reputation on account of many failures which in the first place never should have been invited.

In discussing this question there is one feature which must not be overlooked—the matter of personal equation. There are some men who never did take kindly to the manipulation of gold foil, but to whom the inlay method appeals at once. If such a thing were possible, it would seem as if they were temperamentally opposed to gold and attracted by inlays. Such men will accomplish better results with inlays in most cases than they will with gold foil, but they are not necessarily men whom the rank and file of the profession may safely follow. I know one man who for more than forty years used no other gold for filling teeth than crystal gold, and he did good work with it; but the profession generally could not do it. And so in discussing inlays we should not allow ourselves to be influenced too much by the personal bent of individuals, which in many instances amounts to an unwarranted though unconscious prejudice on their part.

The great danger of inlay work, as I view it, is that it will lower the skill of the profession. Not that it necessarily does this, nor that it does not require skill to do good inlay work, but the process has been heralded as being so simple and there are so many temptations to slight the work, that I fear for the demoralizing effect which this may have upon our operators. With gold foil the fact is apparent at every turn that painstaking care is necessary for good results. No operator, for instance, could for a moment delude himself with the idea that gold foil would save a tooth if it were not properly adapted to the walls of the cavity;

but with an inlay there is likely to be the feeling that the cement will take care of any little imperfections in adaptation, and the license given by this feeling will too frequently lead to indifferent technique.

Anything which lowers the skill of the operator or which invites carelessness is detrimental to the best development, and above all things in considering inlay work the fact should be constantly emphasized that to accomplish good results the most minute attention to detail in every step of the process is absolutely essential.

To sum up, my plea is for a broader view in the selection of materials for filling teeth in accordance with the indications presented in each individual case, for a reasonable conservatism which refuses to discard entirely the old for the new simply because it is the new, for an honest and unprejudiced test of every invention or method which promises to be of utility to our patients with the idea of finding out its real merits, and for the closest attention to detail and the most painstaking care in all our work, no matter what method or process we are employing.—*Dental Cosmos.*

PYORRHEA. By Julian Smith, D.D.S., Austin, Texas. So much of a scientific nature is being written about the causes of this disease that I shall touch very lightly on that point, as the theories differ so largely that one must decide finally that the etiology of the disease is still rather obscure. That there are both local and systematic causes for most of pyorrhea, I think there is very little doubt. For a genuine case to develop, there must be susceptibility, which means a certain systematic condition which lowers the vitality of the surrounding tissues, permitting the germ, or local conditions, to create the irritation which results in inflammatory conditions causing the destruction of tissue and consequent lesions. Dr. D. D. Smith of Philadelphia, one of the most prominent local cause theorists, speaks of "any mouth with pyorrhetic tendencies," evidently believing that what would be sufficient to cause pyorrhea in one mouth would not do so in another.

Autointoxication is described by Dr. Talbot as "The poisoning of the system by poisonous products produced in the system, mainly in the intestinal tract, entering the circulation and carried to the

various glands, where they are either absorbed or eliminated." This condition causes a lowered vitality in the system and creates what we call a susceptibility. Deposits of various kinds, mostly calcic, mechanical irritation, crowded and irregular teeth, where foreign substances lodge and act as irritants, are the local causes. There is no doubt in my mind but that the disease is contagious, as is evidenced by its invasion into the mouths of so many young people, who have a perfect health record, but whose parents have for years suffered from the trouble. I do not think that heredity has anything to do with it, except in so much as it may influence the general system, to sustain a pyorrhetic susceptibility.

I am inclined to use the term pyorrhea as a generic title for all forms of inflammation about the cervical margin of the teeth, recognizing in my own mind the difference between a simple case of marginal gingivitis from a case of phagedenic pericementitis. But the treatment for either only varies in degree. I prefer to call the milder forms pyorrhea in its primary stage; where there is some loss of tissue, showing signs of a continued disintegration, its secondary form, and where pockets are formed and pus present, accompanied by looseness of teeth, and all the graver symptoms, its tertiary stage. The people are beginning to "take notice" today whenever pyorrhea is mentioned and their education is beginning on this subject and the oftener the term is brought to their notice the sooner their education will be completed. I want them to understand the serious and fatal ending of an uncared-for case of gingivitis, and by calling it pyorrhea in its primary stage I am sounding a warning to them that by any other name might have no significance.

On account of the feeling of inability to cope with this disease in the past I think we have all been remiss in our duties to our patients and have allowed curable cases of pyorrhea in its primary stage to continue to its secondary and even tertiary stage without a word of warning, simply accepting the old-time theory that it is incurable. But I hope and believe that that period is past. Whenever you see an inflamed surface about the gum we should go beneath and remove the cause for it and then continue the treatment until a normal condition is secured. One of the reasons that the profession does not pay more attention to this primary condition is that the treatment is often a prolonged one, and their just fee

looks like extortion, but this is one of the barriers that must be overcome if we expect to prevent the increase of the disease. While I believe that pyorrhea in its secondary stage is curable, and in its tertiary stage temporarily curable, still the real solution is to prevent its reaching so far.

The treatment sounds easy when one is told, and it can be told in a few words: It is simply remove all dead or disintegrated tissue about the root and any deposits or foreign substance, curette the bone, making the edges smooth, and then use germicidal agents and solvents of calcic deposits, together with suitable mouth washes, disinfectants, astringents, etc., and you have all the information you need, but we will go a little more into detail. After first extracting all hopeless teeth, we must thoroughly remove all deposits and follow the scaling and scraping with thorough polishing, using such means as we find most efficient in our hands. In this scaling operation it is nearly always necessary to anesthetize the parts, which can be done by injecting a good local anesthetic into the pockets, using a blunt end needle set against the tissues. Never attempt more than two teeth at a sitting. In fact, I often spend more than an hour on one. After polishing pure lactic acid or phenol-sulphonic acid should be worked into all pockets to dissolve remaining particles of calculus. The breaking down of the alveolar bone is necrosis, and curetting of the margins is, therefore, undoubtedly indicated. Not only is this done to remove the necrosed bone, but to smooth the roughened jagged edges, which act as a great irritant to the already inflamed gum tissue. Those of you who have examined maxillary bones which showed evidence of pyorrhea alveolaris during life have noted this condition. This curetting accomplishes two other purposes of value—blood-letting and the production of new tissue, which is less easily attacked by recurrent pyorrhea than the old one. The operation, though heroic, is not very painful, being done with the tissues anesthetized in the manner stated above.

The after-treatment I consider as important as the instrumentation and should always be done by appointment, so that due time may be given to it. Once a week I massage the gums with vaseline and powdered sulphur, at which time I treat pockets with phenol-sulphonic acid, full strength, applied with a broach wrapped with

cotton. Twice a week I apply the following preparation to pockets and loose gum margins:

Zinc Iodid	grs. 30
Aqua	m. 20
Iodin Crystals	grs. 50
Glycerin	drms. 3

I then paint the gums with iodin and aconite. During the early parts of the treatment I frequently use a solution of zinc sulphocarbolate in place of the zinc iodid formula. This is a great stimulant and astringent and has a tendency to close the pockets, thus keeping out foreign substances. Where there is much loose overhanging gum tissue I either trim it off or use trichloracetic acid. I always insist on the thorough use of a good antiseptic mouth wash three times a day, forcing it through the interdental spaces vigorously. This acts as a massage as well as a stimulant and antiseptic.

I trust that this paper may do some good in calling attention to the necessity for early treatment and hope that it may, in a measure, persuade some of the skeptics that the cure of pyorrhea is not altogether a dream.—*Texas Dental Journal.*

THE ALUMINUM PLATE. By L. P. Haskell, D.D.S., Chicago, Ill. The aluminum plate has come to stay. My fifteen years' use of it has convinced me that it is durable; is not affected by the secretions of the mouth; is healthful to the tissues; is easily worked, and is far superior to vulcanite, with its non-conductivity.

Its modus operandi.—A plaster impression, shellacked, prepared thin, so as not to leave a film; soaped, the excess washed out, and impression carefully filled. Upon removing the model build up to an inch thick, with sides flaring so it will drop from the mold, never to be lifted out. If there is some undercut, raise the front higher than the heel, and slope the heel more. Instead of scraping the impression, which is a very uncertain thing to do, make a "relief" for the hard center, of thin sheet wax, extending from near top of the ridge, well back to the posteriors, within one-quarter inch of the heel of the plate, and it can be worn farther back than is usually made. No scraping of the *soft* parts is advisable. Shellac thin.

For molding use oiled sand, the "Chase" because it works better

than water, and is always ready for use. No sifting is needed. Use a molding flask 5 inches in diameter, 2½ inches deep, so as to have plenty of room for packing, to do which use a small potato masher, the handle for the sides and large end for the top, and pack hard. Use Babbitt metal, as it is the only alloy which has all of the five requisites for a dental die, viz.: Non-shrinking, hard, tough, smooth and melting at a low temperature. A proper Babbitt metal can be had at the dental depots. It is a mistake to suppose that the shrinkage of zinc is an advantage, for the expansion of the plaster impression contracts the opening; the expansion of the model can be only outwards, and is in reality a trifle smaller than the jaw instead of larger.

The couter die is six parts lead and one of tin, to reduce melting temperature, pouring not as hot as comes from heater.

Use the *soft* aluminum as it is already annealed, gauge 20. The horn mallet as it comes from the factory is worthless, for the pointed end is useless, and large end is too large. Saw off the long end where it is three-quarters inch in diameter and round with rubber file.

Begin swaging at the tuberosities, then in the palate, and as the metal is easily marred, place several thicknesses of cloth over it so as not to mar the surface, then mallet the sides and swage.

In trimming the plate bear in mind it should be carried as high as possible all around, and *always* highest over the cuspid eminences. How high can only be determined by trying in the mouth. Some recommend the turning of the edge. This, of course, cannot be done if the plate is of the right height, and besides, it is not at all necessary, as the vulcanite makes a good finish to the margin.

Placing in sulphuric acid is of no consequence, as it will not remove any traces of base metal which may be on the surface. That may be polished off.

The serrating of the surface to retain the vulcanite is very uncertain. The sure method is in the use of the "loop-punch," a series of eight loops near the margin, equi-distant, and eight on the ridge. In waxing up the lingual portion avoid a feather edge, letting the wax be left straight from the necks of the posterior teeth to the plate, but *sloped* back of the anterior teeth. Polish same as a vulcanite plate, the final polish being with a dry felt.

The ordinary felt cones are not of much account. With a sharp knife cut in slices one-quarter inch thick both the large and small cones, then they are very useful. After finishing, immersing in a solution of caustic soda for a few minutes gives a silver appearance.

A plate can be swaged as perfectly with a hammer as in a press, perhaps not quite as quickly.

My objection to casting into the impression is that I have no model to refer my plate to after swaging.

A plaster impression, correct model from it, Babbitt metal die, plate swaged on that die will fit the plaster model snugly. If the model is a correct representation of the jaw, the plate ought to be a perfect fit, and that is just what it is.—*Dental Brief.*

THE BACKING AND SOLDERING OF TEETH IN BRIDGEWORK. By J. W. Halsell, D.D.S., Dallas, Texas. The fear of checking teeth in soldering at one time made that part of bridgework the one of most anxiety to me, so the observation of a few simple precautions may be of some benefit to us all.

The grinding of teeth for the reception of the backing should be accomplished with stones and finished with sand-paper discs.

In shaping the back toward the incisal or occlusal end of the tooth gradually bevel it from the pins to the end so as to bring almost to a feather edge the portion from the pin to the gingival and leave straight, or, if you wish the gold to extend over the end of the tooth, as in flowing solder between the tooth and the cap of a Richmond crown, do not have an abrupt angle over which to place your backing, but round off the angle and polish very smooth, so that in the contraction of the solder there will be no abrupt angle to catch as in a vise, but instead a smooth, round surface over which the contracting solder will glide.

The backing should be cut to fit the tooth and burnished as closely as possible, then remove from the pins, anneal, then replace and burnish again and, if necessary, burnish again, and before replacing for the final burnishing, cut the pins half way in two, replace the backing, bend the pins down, with the end of the pins resting firmly against the backing, then burnish the gold closely around the pins and after the final burnishing flow hard wax over the surface.

In replacing the teeth on the model leave a space between each tooth in which you can place a very thin spatula. After investing and removing the wax, trim away all overhanging investment materials, and cut away all corners and angles possible, so the flame can spread out when coming in contact with the backing. Trim the investment so as to have more than one base if necessary, so you can turn it over, thus allowing gravity to assist in the soldering. You can carry solder up hill, but it is much easier to carry it down hill. Don't try to drive your solder, but lead it; that is, if you wish to move your solder to some other position, keep the hottest part of your flame in front of the solder, not behind it.

Usually in soldering a bridge of two or three abutments, if the bridge is not over eight or nine teeth, I solder all at once by commencing at one abutment and soldering up to, but not including, the middle abutment; then I go to the other end and solder up to the middle abutment, then join the two pieces.

In bridges of more than three abutments, I make three or more solderings.

The great essentials in good, smooth soldering are having the investment thoroughly heated, and a steady clear flame.—*Texas Dental Journal.*

USES OF DENATURED ALCOHOL. By W. H. Reaben, D.D.S., McComb, Miss. In denatured alcohol we have a clean, efficient, ever-ready and comparatively clean fuel.

As a fuel, it ought to supersede coal oil and gasoline in the dentist's laboratory to a great extent. For the vulcanizer, in place of coal oil or kerosene, it answers admirably, being clean and reliable.

Some months ago I became tired of the frequent smoking of coal oil in the use of my vulcanizer, and poured the oil out, substituting immediately therefor denatured alcohol, which went right along doing the work of the coal oil. The whole vulcanizer was since painted with aluminum, and the latter, in several months' use, has not burnt off, nor become greasy nor dirty.

Coal oil is unreliable; it is very apt to get to smoking, in which case gases are formed that ignite and run up the heat, and consequent steam pressure, to a point where the plate is ruined, and in many cases the vulcanizer explodes. I read in the current issue of

this journal accounts of three explosions, two of them very serious. Think of it!

In this connection I will say that all these accidents could have been prevented by the use of automatic heat-regulating and timing vulcanizers. No dentist should be without one. The pressure cannot get beyond a certain point, the light being automatically lowered. And when the time is up the timing clock puts the light out.

Another use for denatured alcohol is in fusing porcelain—Jenkins low-fusing porcelain, if you please.

It is not necessary to have a furnace or muffle for the majority of small inlays, though I do occasionally use my furnace for large inlays. I fuse nearly all my inlays by simply holding the matrix in a pair of tweezers over a denatured alcohol flame. You can then see what you are doing and are not near so apt to burn out the color. If the porcelain comes in contact with the flame there is no harm done, if it is not held there too long, for the heat is intense and your color would disappear.

I have never been able to get the colors from the bottles, with my Turner furnace, nor otherwise, to correspond with sample; the colors I get are several shades lighter.

On account of the above I made a shade-guide, baking samples from each bottle.—*Dental Summary.*

THE DOWEL OF THE BANDLESS CROWN. By J. H. Crossland, D.D.S., Montgomery, Ala. Conspicuous among those gleaming, glittering, cruel things which have held high precedence in the golden age of dentistry, and from which progressive practice has receded to such extent that conservatism permits their use occasionally, instead of demanding it generally, is the banded crown.

Perhaps no modern dentist will challenge the statement that progressive practice is not all that has receded from this crown, which came to the pioneers of the golden era with the full sanction of mechanical laws, but which has so signally and so generally failed to meet the imperious demands of physiological laws.

Analysis of the two forms of crowns, with their modifications, discloses to the essayist the following points: In favor of the banded: superiority in strength of attachment and protection of

cement from agencies of disintegration; esthetic, physiological, indeed all other requisites in favor of the bandless. After having fitted (?) many bands he has become profoundly impressed with the idea that no crown should have a band when reliable attachment can otherwise be made. A dislodged or stretched and bent dowel is by no means a pleasing discovery to make on the complaint of a patient who was so highly pleased with the beautiful porcelain crown set only a few months ago; and a split root is easily among the most melancholy returns which our labors may bring us.

What is the usual cause of such results, especially in cases in which the root was fairly strong? It is the shortness or thinness, or both, of the dowel—a question of natural philosophy, of leverage primarily, and secondarily of cutting. Shortening the dowel facilities so greatly the adaptation of the porcelain crown that it seems to be almost universally resorted to. The effect of the same is to place the weight and the fulcrum nearer together and increase the leverage, and, of course, correspondingly decrease the force necessary to move the weight or crush the fulcrum, or bend or break the lever. And the thinness of the dowel, like the sharpness of an edge tool lessens the pressure necessary to cause penetration.

Had we a variety of cement approximating in tenacity the root itself and at the same time impervious to the chemical agencies so disastrous to those which we have, the length and size of the dowel would concern us but little and the split root would be no longer among the dismal probabilities which we must consider in determining the form of crown for a frail root. But, unfortunately, we are yet without that splendid acquisition. Indeed, the best that we have is barely worthy of the name. We have adopted many valuable procedures from the arts and mechanics; let us adopt another. Being unable to increase the tenacity and adhesiveness of the binding material, let us increase the surface to which it is to adhere, and at the same time decrease the amount of it by making a closer joint, after the manner of the cabinet-maker, with his dowel and his glue, or any mechanic using a cement weaker than the substance to be joined. For illustration, let us select an incisor root of decidedly conical form and quite extensively decayed in the gingival region, and that form of porce-

lain crown in which are united the poetry and philosophy of tooth-crowning—the Logan.

Place just enough filling material in the apical foramen to close it and not be dislodged by the pressure of the cement. Having ground the root to the desired form, shorten and sharpen the dowel, if necessary, sufficiently to allow the crown to come into contact with the root without its tightening in the canal—even though to accomplish this it may be necessary to remove half or two-thirds of its length—which will greatly facilitate its judgment. Fit the crown by grinding, and if necessary bake-on additional porcelain. Cut a piece of platinum foil such as we use for inlays to rectangular form, making its width somewhat greater than the length of the canal—its length being dependent upon the size of the canal. Perforate it freely with a plate punch or an Ainsworth rubber-dam punch to permit ingress of the solder, then, having rolled it into the form of a cornucopia, approximating the size of the canal, place it over the stub of the dowel and press the crown to place. Remove the crown and remove the foil from the dowel or from the canal, clip off the surplus, return it and replace the crown. Remove the crown; the foil will generally come away with it, but if it does not, split the stub of the post and spread the ends, or wrap a piece of fine platinum wire around it, and press to place again. Then remove the crown and the foil will come with it. The foil and dowel or stub of the same are then united by soldering, and the latter filled in or made sufficiently stiff. Should the soldering cause it to fail to enter the canal entirely, carry in a little rouge on a wisp of cotton, insert the post, and remove; touch red spots with a stone. Thus we make the dowel fill practically all of the canal. The essayist has applied this method for several years and has found it highly satisfactory.

A simple and easy way to enlarge a dowel is to wind fine platinum wire around it until it approximately fits the canal, and unite the wire and post by soldering. This method is best suited to cases in which it is not necessary to lengthen the pin; but a little experience will enable one to so manipulate the wire that lengthening will result. This method has also been found very convenient and valuable.

Another method of either enlarging or lengthening, or both, is

to fill the canal with wax and press the crown to place, and remove all, and cast gold to reproduce the form of the wax. Of course, the gold may be cast on the pin or separate from it, with a canal for it, and the gold and post may be united by soldering, or the gold set in the canal, and the crown set as in the usual way. Guttapercha may be used for one or both settings. The latter method is offered as a suggestion only, as it is an untried idea of the essayist.

The extent to which a small canal should be enlarged to permit the enlargement of the dowel—just how much should be taken from the root and given to the post—is always a question for the judgment of the operator; but the question of leverage referred to above should always be thoroughly considered, for it is a plain mechanical fact that, other things being equal, addition to the length of the dowel diminishes the liability of splitting the root as well as breaking or bending or dislodging the dowel.

Thus may we widen the field of usefulness of the bandless crown. The object of this effort is not to depreciate the value of the banded crown—the Richmond was our ideal of other days, and we resort to it now in some instances. When the frailty of the root and the limited tenacity of the cement prohibit reliance upon the dowel alone, we choose it as a lesser evil than a plate or a bridge.

Reference to a considerable variety of cases to which these methods are applicable, together with a number of details necessary in the adjustment to them, are omitted for brevity's sake.

In conclusion, apology is offered for having consumed so much valuable time in saying, *lengthen and enlarge the dowel of the bandless crown.—Dental Cosmos.*

Proper Care of Teeth.—I believe any individual's natural teeth may be saved from childhood to extreme old age, if the proper care is given them at the proper time. The examinations should be made at intervals sufficiently frequent to prevent any cavity which might form from extending beyond the first stages. By neglect every degree of decay is passed through, until an inlay involving the entire crown may be required, and treatments and root fillings be necessary under it; yet the value of a natural tooth, and its superiority over the artificial is so great that the end justifies the means.—H. W. McMillan, *Dental Review.*

The Dental Digest.

PUBLISHED THE LAST WEEK OF EVERY MONTH

At 2231 Prairie Avenue, Chicago.

All communications relating to the editorial department should be addressed to Dr. J. P. Buckley, Editor, 163 State Street, Chicago.

Editorial.

Fourteen years ago THE DENTAL DIGEST was organized by Dr. J. N. Crouse, the president of the Dental Protective Association, who has ever since been its publisher, and who also until the last year or so has written most of its editorials.

It will doubtless be somewhat of a surprise to our many readers to learn that, beginning with the next issue, the publication of the journal will be under the direction of the Dentists' Supply Company of New York, and a new editor will have charge of its editorial pages.

THE DENTAL DIGEST has always aimed to stand for the highest and best there was in dentistry. The publisher has spared no expense to make this journal one of the best dental publications. Its editorials, written with a free and fearless hand, have championed at all times the cause of dentistry.

The present editor has had charge of the editorial direction of the journal for the last nineteen months, during which time he can truthfully say that he has thoroughly enjoyed the work; nevertheless there is a feeling of satisfaction on his part to know that he will be relieved of his editorial duties and can again devote his leisure time to research work, which has ever been dear to his heart, and in which field he believes he can be of the greatest service to his profession.

The editor desires to thank all those who have in any way assisted in making THE DENTAL DIGEST what it is to-day, and he bespeaks for the new management a pleasant and prosperous undertaking.

J. P. BUCKLEY.

To the Dental Profession:

In giving up the active business management of THE DENTAL DIGEST I wish to express my thanks for the hearty support and encouragement which I have received from my friends in the dental profession throughout the entire country.

If at times I have seemed to be severe in my criticisms and over-earnest in my appeals, I can say sincerely I have had nothing but the best interests of my profession in view, and have always tried to give everyone fair treatment.

While I am giving up the active responsibilities of THE DIGEST, I still expect to be closely allied with the journal and its interests, and shall from time to time furnish editorials and matter which I think will be of interest to the readers.

Changes in business affairs make it necessary for me to relinquish the active management of the journal, and I bespeak for the new management the cordial support which I have received from the profession for the last fourteen years.

Articles of interest to the profession will be specially welcomed at this time during the transition. Full and free discussion pertaining to any departments of our work will also be gladly welcomed.

We hope and expect to make the journal all that it has been and far more.

Thanking the profession and all of our other friends for their hearty co-operation, I remain,

Yours fraternally,

J. N. CROUSE.

Obituary.

W. B. ALLEN, for many years a prominent dentist of Huntsville, Ala., died in Texas in November, 1908.

JOHN S. BENNETT, 31 years old, a dentist formerly of Owensboro, Ky., died of Bright's disease at Sacramento, Cal., Nov. 17, 1908.

WILLIAM A. ROOT, 49 years old, a prominent dentist of Sacramento, Cal., died from kidney trouble Nov. 18, 1908.

CHARLES OTIS, 67 years old, a well-known dentist of Barrington, Ill., died Nov. 18, 1908.

JOHN W. GARNER, 59 years old, for thirty-nine years a dentist of Muncie, Ind., died from pneumonia Nov. 16, 1908.

S. F. EARHART, for more than thirty-five years a dentist of Indianapolis, Ind., died following a long illness Nov. 27, 1908.

S. H. LYVYER, 67 years old, one of the leading dentists of Brazil, Ind., died from heart disease Nov. 19, 1908.

C. F. DAY, 52 years old, a dentist of Lakeview, Mich., died Nov. 30, 1908.

FRANK HARRIS, one of the most prominent dentists in the state, died at Henderson, N. C., Nov. 19, 1908.

ROBERT SABIN, 37 years old, a dentist of Salt Lake City, died from rheumatism Nov. 26, 1908.

D. P. LUTZ, 83 years old, a pioneer dentist of New Kensington, Pa., died Nov. 27, 1908.

A. B. LONGSHORE, 39 years old, a dentist of Herndon, Pa., died Nov. 27, 1908.

JOHN SCHWARTZ, 45 years old, a dentist of Sioux Falls, S. D., died from heart failure Nov. 14, 1908.

GUILFORD SHAW REED, 71 years old, a dentist of Cambridge, Mass., dropped dead in his office from heart failure Dec. 1, 1908.

FRED S. GRANGER, 25 years old, a dentist of Plainwell, Mich., died from typhoid fever Dec. 3, 1908.

Notices.

OHIO STATE DENTAL SOCIETY.

At the forty-third annual meeting of the Ohio State Dental Society held in Columbus, Dec. 1, 2 and 3, 1908, the following officers were elected: President, W. H. Whitslar, Cleveland; First Vice-President, M. H. Fletcher, Cincinnati; Second Vice-President, A. O. Ross, Columbus; Secretary, F. R. Chapman, Columbus; Treasurer, W. A. Price, Cleveland. Board of Directors for three years: L. P. Bethel, Columbus; C. I. Keely, Hamilton; J. R. Callihan, Cincinnati; Henry Barnes, Cleveland.

F. R. CHAPMAN, D.D.S., Secy.,
Columbus, Ohio.

NEW YORK ALUMNI ASSOCIATION OF THE XI PSI PHI FRATERNITY.

The New York Alumni Association of the Xi Psi Phi Fraternity met at the St. Denis Hotel on Nov. 18, 1908, and elected officers for the ensuing year. It was decided to hold the annual banquet on Jan. 30, 1909.

The membership has passed the two hundred mark, and it is earnestly desired that every alumnus be present.

To any who have not received full particulars the same will be gladly furnished by the secretary.

J. N. GELSON, D.D.S.,
673 Vanderbilt Av., Brooklyn, N. Y.

LA SALLE COUNTY (ILL.) DENTAL SOCIETY.

The annual meeting of the La Salle County Dental Society was held in Ottawa, Ill., in November, and officers for the ensuing year were elected as follows: President, B. N. Hughes, Mendota; Vice-President, R. A. Smith, Spring Valley; Secretary-Treasurer, M. A. Yule, Mendota.

LATEST DENTAL PATENTS.

902,109. Dental finger tray, J. G. Powell, Norris City, Ill.
902,122. Tooth cleaner, E. E. Sulzer, Philadelphia, Pa.
902,462. Treating teeth for filling, F. Armstrong, Dunedin, New Zealand.
902,463. Dental apparatus, F. Armstrong, Dunedin, New Zealand.
902,562. Dental cement, J. N. Crouse, Chicago, Ill.
902,796. Combination toothbrush and powder holder, F. W. Archer and T. H. Bates, Chicago, Ill.
902,942. Dental tool moistener, S. Craig, Clarksville, Tenn.
903,343. Artificial tooth, J. A. Van Vleck, Gallipolis, Ohio.
903,344. Dental lip protector, E. C. Wackler, Milwaukee, Wis.
903,489. Appliance for casting dental gold inlays, V. Macdonald, Melbourne, Victoria, Australia.
904,126. Hand-operated plugger, C. H. Hart, Hartford, Conn.

News Summary.

To Keep a Hypodermic Needle from Rusting.—When we buy the needles they are provided with a small wire inserted in the needle. Replace this with a coarse hog's bristle or one from a large paint brush when the needle is not in use.—P. J. Pegan, *Dental Review.*

To Care for Teeth.—The Neighborhood Settlement House of Lynn, Mass., has given its annex, a six-room cottage, as a home for a dental dispensary to be restricted to the care of teeth of children that might otherwise be neglected. The staff of the dispensary is made up of well-known local and Boston dentists who have volunteered for the service.

Swallows Tooth; Asks $10,000.—Dick Uren of Newell is suing Drs. S. A. and M. L. Beason, dentists of Newell, for $10,000 damages. He alleges that in extracting a tooth due care was not taken, that a tooth was allowed to drop into his windpipe and then pass into his lungs. For the illness resulting he wants damages.—*Marshalltown (Ia.) Times-Republic.*

Occlusion of Artificial Teeth.—The occlusion is one of the most important things in artificial teeth. I was so unfortunate as to have all my upper teeth knocked out, and I am wearing a plate in the upper jaw. When I had made the occlusion as well as I could by touch paper and the stone I took carborundum into my mouth and completed it by grinding the carborundum, and I have an occlusion that is just as smooth and just

as perfect as the occlusion of the natural teeth.—G. V. BLACK, *Dental Review.*

DETECTING MOISTURE IN INVESTMENTS FOR INLAYS.—A sure way to determine if the moisture is all driven out of the investment for gold inlays during the preliminary heating is to place the investment, sprue end up, on the zinc top of the work bench, and if any moisture remains in the investment a round, moist spot will show on the zinc.—C. B. PLATTENBURG, *Dental Review.*

SUICIDES.—Depressed by an apparently uncontrollable melancholia which had haunted him since the suicide of his wife on Nov. 13, Dr. Randolph F. Hass, a New York City dentist, ended his life by swallowing poison while kneeling on his wife's grave, Dec. 2, 1908.—Richard Clark, a dentist of Tabor, Ia., committed suicide by shooting himself in the breast with a shotgun Dec. 5.

DENTISTS HOLD MEETING AND DECIDE ON A COURSE OF STUDY.—The Cedar Rapids (Ia.) Dental Society recently held a meeting and decided to adopt Dr. G. V. Black's book on Operative Dentistry as a course of study for the year. The plan is to have one member of the society study a chapter of this book and then demonstrate at the regular meetings, these occurring once or twice each month.

THE NEW ORLEANS DENTAL COLLEGE.—Nov. 13 the building of the New Orleans Dental College was totally destroyed by fire. This disaster, coming in the very midst of the session, was a heavy blow to the institution, but the officers and friends of the college went energetically to work, and with the assistance of friends arrangements were promptly made to house the establishment in temporary quarters, so that the classes were resumed as if nothing had happened.

CLEANSING THE TEETH.—The problem of cleansing the teeth is comparatively simple. The two indispensable ingredients are precipitated chalk and soap. It is necessary to find a soap which will not only act as a lubricant but also have a high solvent power for fat, be compatible with disinfectants and serve as a medium for binding these together and which in itself is sterile. It must be expressly manufactured for this purpose.—N. S. JENKINS, *Dental Review.*

ZINC OXID LINING FOR ATTACHMENT OF PORCELAIN INLAYS.—Zinc oxid heated to a temperature of about 2,800 degrees becomes hard, vitrified and granular. To two parts, by weight, of the granular zinc oxid, which is the principal constituent of cement powder, is added one part of foundation body. Give the inlay matrix a thin coating of this mixture, having it quite moist. Do not jar to place, for the coarse zinc oxid would then come to the surface and the foundation body would settle to the matrix. Place in furnace, but do not bring to the temperature required to fuse the foundation body. The coating will show a distinct yellow color when taken from the furnace, but will change to light gray as soon as cooled.

Proceed with the foundation body as for ordinary inlays. Upon removing the matrix, if you find some part of the base slightly glazed, scratch it with a sharp-pointed instrument and the granules of the zinc oxid will appear. You will now have a finished inlay, having not only a roughened surface to which the cement will cling, but also one with which the liquid of the cement mix will unite chemically, and there will be actual cohesion of the inlay surface and the cement.—A. M. HARRISON, *Dental Review.*

PROPER TREATMENT OF ROOTS.—Fixed bridges, or attachments of any kind, are wholly dependent upon the correct treatment of the roots of teeth supporting them. I think that a tooth had better be extracted at once than improperly treated. This is the key to all successful partial restorations, whether removable or fixed, because the removable as well as the fixed is dependent on the condition and permanency of the roots.—C. N. THOMPSON, *Dental Review.*

ROOT CANAL TREATMENT.—More than one-half of the pulp canals treated become well in spite of the treatment and not from it. With regard to drilling out canals, personal experience leads to the thought that in certain cases, where it is possible and feasible, it is a wise procedure. In cases where it is not possible I rely upon thorough desiccation and flooding the canal with formol and vaporizing the formol with hot silver or copper wire. It is the vapor of formol that disinfects.—G. B. HAYES, *Dental Review.*

EXAMINING BOARD AFFAIRS.—At the October meeting of the Massachusetts Board 29 out of 61 applicants were successful in passing the examination.—Warrants have been issued against 69 dentists of Portland, Ore., for failure to pay the occupation tax of 1908. Fines of $15,000 could be levied against nearly all the dentists should the letter of the law be carried out, for under the state law it is provided that each day of practice after failure to pay constitutes a separate offense. The maximum fine prescribed is $100 and the smallest fine possible $5.—Governor Patterson of Tennessee has appointed Dr. J. B. Jordan of Nashville a member of the State Board.

MARRIAGES.—J. G. Bauer, a dentist of Bement, Ill., was married to Miss Lulu Hayes, also of Bement,, Nov. 21.—Ernest D. Watts, a dentist of Mazon, Ill., was married to Miss Rose Abrams of Pontiac in November.—Lyle F. Jeffers, a dentist of Hampton, Ia., was married to Miss Mabel V. Hoffman of Muscatine Nov. 26.—Fred Nell, a dentist of Lowden, Ia., was married to Miss Nina E. Smith of Cedar Rapids Dec. 4.—Theodore Roosevelt, Jr., a dentist of Clarion, Ia., was married to Miss Dot Souits of Ackley Nov. 18.—D. P. Ridel, a dentist of Solon, Ia., was married to Miss Leona Martin also of Solon, in November.—G. E. Pendarvis, a dentist of Erie, Kan., was married to Miss May McDonald of Chanute Nov. 18.—J. F. Mullins, a dentist of West Stockbridge, Mass., was married to Miss Catherine Cummins of Great Barrington Nov. 17.—J. F. Mayrock, a dentist of Wilkesbarre, Pa., was married to Miss Matilda C. Maier, also of Wilkesbarre, Nov. 19.—Frank Ingram, a dentist of Cottage Grove, Ore., was married to Miss Maude Samuel of Dayton, Wash., Nov. 23.—Albert J. Smith,

a dentist of Waukesha, Wis., was married to Miss Madeline C. Busjaeger also of Waukesha Nov. 4.

CONVENIENT BROACHES.—Instead of using a small handle, have had a great deal of success in instructing assistant to soft-solder on old instruments of different angles. Such instruments are always at hand, disinfected, and easily applied.—W. M. COOPER, *Dental Review.*

RULES FOR EATING.—1. Do not eat until a plain piece of bread or a dry cracker tastes good. 2. Chew all solid food until it is liquid and almost or quite swallows itself. 3. Sip all liquids that have taste, including soups, sodas, lemonades, etc., until all the taste is out of them. It is well worth while. Pure water for quenching thirst has no taste and may be swallowed immediately. 4. Never eat while you are worried or angry—only when you are calm. Waiting for a calm mood will bring good appetite juice; without it there is poor digestion. 5. Learn and practice these four rules; eat whatever appetite calls for most loudly, and both your teeth and general health will be fine.—HORACE FLETCHER, in A. B. Z. of *Our Own Nutrition.*

FATALITIES.—Mrs. Anna Lindsay, a widow 65 years old, living in San Francisco, Cal., died in a dentist's chair, while under an anesthetic, from heart disease Nov. 15.—Mrs. A. Fecor of Oswego, Ia., died in a dentist's chair of heart weakness while under the influence of an anesthetic Nov. 19.—The prospect of a trying ordeal in the dentist's chair caused Mrs. Elizabeth Arth, 61 years old, of St. Louis, Mo., to become ill and fall dead in a street car while on her way to her dentist.—Joseph Murray, a former merchant of Cropper, Okla., died Dec. 3 of blood poisoning, resulting from the extraction of a tooth. A few months ago Murray had a tooth extracted, following which the gums became seriously inflamed and blood poisoning supervened.

ORTHOFORM—ITS EFFECTS, PROPERTIES AND USES.—It is a white crystalline powder, of weak acid reaction, slightly and very slowly soluble in water, freely soluble in alcohol, ether and chloroform, and is without odor or taste. Upon the tongue, orthoform produces at first no apparent effect, owing to its low solution; after a minute a gradual numbness is noticed, and the limited locality loses its wonted keen sensibility to pain. When exhibited in dry powder it is practically non-poisonous—internal dose 0.06 to 0.65 gm. (gr. i-x), and may be used locally *ad libitum,* but when applied freely in solution or ointment it might induce some trifling unpleasant sequelæ. It possesses some antiseptic and anesthetic properties, and is unquestionably a most distinguished analgesic; it is accordingly indicated in severe burns and scalds, ulcers of the tongue and lips and of other parts; to relieve the pain after extraction of teeth; in pyorrhea pockets, before and after operation, and it is especially effective in reducing the interminable agony of "dry socket." In the latter case, wash out with a syringe and warm water, then gently place in the socket a pledget of loose cotton wool holding in its meshes as much of the powder as they

can carry; and the erstwhile suffering patient will indeed be truly grateful. The application need not usually be repeated for a day or two, as the beneficent effect of the drug is prolonged, mainly owing to its slow solubility.—J. S. CASSIDY, *Dentist's Magazine.*

AN ACCURATE AND SAFE WAY OF APPLYING SILVER SALTS.—Secure three sizes of smooth, flexible, canal-dressing instruments of platinum, German silver, or the so-called platinoid material. Secure a small, wide-mouthed bottle and place in the same the granular silver salts. Heat your instrument slightly and plunge it into the bottle, taking up a crystal of any size that you may wish to use. Your crystal, which is now only slightly attached, is passed back and forth in a flame until it is thoroughly fused on the very tip of your instrument. Having thus been fused to the end of the instrument, the salt can in full strength be safely and accurately applied to either hard or soft tissues.

Silver nitrate is preferred by the clinician if discoloration be not objectionable.

In applying salts by this method it must be kept in mind that the salts are used full strength; the tissues must therefore be protected by the use of napkins and the saliva pump. If the spot to which the salt is applied is not moist enough to gradually dissolve the fused point, it is moistened with a little damp cotton. By having flexible instruments of three different sizes, the point of fused salt can be applied in varying sizes, which allows greater accuracy. The flexible instruments can be bent to any angle desired.—A. J. FLANAGAN, *Dental Cosmos.*

THE LEUCODESCENT TREATMENT OF PYEMIA.—I have had such a satisfactory case recently that I thought it might interest you. A lady came to me with the glands of her neck swollen (a continuous swelling from the lobe of her ears to her shoulder), and she had been suffering with this condition for about three weeks; she thought possibly it came from her teeth. An examination showed no connection between her teeth and this condition; however, she had slight chills and fever, and this pointed to pus formation. I felt very sure that this condition would necessitate opening it inside of forty-eight hours, but, it not being attributable to the teeth, I felt indisposed to treat the case, as I make it my business to keep within my domain. However, thinking of the experiences which I have had with this light, I felt sure it was well worth the trial. I gave her a treatment at nine o'clock in the morning and another at five o'clock; she telephoned me the following day and said she had slept all night without pain, which she had not done for about ten days, and the swelling had nearly all disappeared. I gave her another treatment, and the condition now is perfectly normal.

This is only one of a number of cases which I have treated with this light, and I have had in each one of them perfect results. When I think that the only alternative for this patient would have been the knife, we ought to feel grateful that we have a remedy which will allow us to eliminate many disagreeable operations. I feel that not only the dental

profession, but also the medical profession, should know the importance of this light in treating certain conditions.—A. E. PECK, *The Leucodescent Bulletin.*

PRACTICE PROPHYLAXIS.—Someone has called dentists who "clean teeth" "dental scavengers;" so though "a rose by any other name would smell as sweet," let us avoid such unkind words and practice dental prophylaxis, not overlooking the fact that he who "cleans teeth" for a paltry fee which does not allow him to take time to do the work well is far below the plane of him who practices the art of prophylaxis for a fee commensurate with the time and skill employed, thus promoting the cause of the education of our patients, and their health, and comfort, and happiness as well. —EDITORIAL, *Pacific Dental Gazette.*

ILLEGAL PRACTITIONERS.—The case against a dentist of St. Joseph, Mo., for practicing without a license has been dismissed on condition that he cease practice and leave the state.—A Seattle dentist who has spent most of his spare time during the past five years in fighting with the State Board because it refused to give him a certificate to practice in that state has recently successfully passed the examination in Portland, Ore. Since the fight began he has been arrested fifteen times and tried ten cases, acting as his own attorney, which have gone to the State Supreme Court.—A dentist of Seattle, Wash., has been arrested charged with pacticing without a license, also with having had under his control three dentists whose names do not appear on the door, as is required by law.—Another dentist of Seattle has been arrested for practicing without a license and released on a bond of $500.

TRIGEMINAL NEURALGIA FROM CHANGES IN TEETH.—Wallisch regards neuralgia in younger persons, when the pain is restricted to one branch of the second or third branch of the trigeminus nerve, as suspicious of a dental origin. The pains are more diffuse than in ordinary neuralgia; they do not seem to follow the track of the nerve, and they vary in intensity, without ever disappearing completely. He relates a number of instances in which a tooth was responsible for severe neuralgia, although the dentist could discover nothing wrong in the teeth. Teeth with a filling in the root are peculiarly suspicious, even when they are apparently entirely free from all reactions; he does not exclude them until removal of the filling and leaving the cavity open for a time—inserting a little cotton during eating—fail to give relief. In one severe case the pain was in the temple and vertex. The more the neuralgia is restricted to the smaller ramifications, the more one is justified in assuming a peripheral cause, possibly an unsuspected non-erupted tooth. Inflammation in the maxillary antrum is often a source of facial neuralgia, as also rheumatic, hysteric and similar disturbances. The neuralgia is often referred to the ear.—*Jour. Amer. Med. Assn.*

[There is frequently found in medical literature evidence of the necessity of a better knowledge of oral pathology among medical men. How kind

Nature would needs be to stop a true neuralgic pain caused by a tooth simply because the root filling had been removed and the "cavity left open for a time, inserting a little cotton during eating." Why not refer such cases to competent dentists, who can treat the case according to modern dental therapeutics, which surely would not permit "leaving the cavity open," with the possibility of a mixed infection and greater trouble? —Editor DENTAL DIGEST.]

FOR TOOTHACHE.—*The Druggists' Circular,* March, 1908, gives the following suggestions for applications for toothache:

℞.	c.c	
Creasoti,		
Chloroformi,		
Olei caryophylli,		or
Olei menthæ piperitæ,		
Olei camphoræ,		
Phenolis liquefacti, āā.....	5	āā, fl℥i

M. et sig.: Apply on cotton or pledgets of felt.

Or,

℞.	gm. or c.c.	
Phenolis liquefacti	5	fl℥ii
Camphoræ	10	or ℥ss
Chloroformi	25	fl℥i
Olei cajuputi, q. s. ad.....	50	ad, fl℥ii

M. et sig.: Apply on cotton or pledgets of felt.

Or,

℞.	gm. or c.c.	
Phenolis liquefacti	60	fl℥ii
Mentholis,		or
Thymolis,		āā, gr. xv
Collodii, āā	1	m. xv

M. et sig.: Jelly for toothache.

Or,

℞.	gm. or c.c.	
Phenolis liquefacti	3	m. xlv
Capsici,		or
Pulveris opii, āa.....	4	āā, ℥i
Olei caryophylii	8	fl℥ii
Chloroformi	75	fl℥iiss

M. et sig.: Toothache tincture.

[The above was copied by the *Journal of the American Medical Association* from the *Druggists' Circular.* It is rather interesting and yet discouraging to note how difficult it is to get away from the ancient "shotgun" prescriptions. Most any one of the many constituents in these prescriptions would relieve an aching tooth, if the pulp was vital and the agent properly applied; but, as every dentist knows, they would have no

effect, singly or combined, if simply applied to a cavity of a tooth the pulp of which was dead.—Editor, DENTAL DIGEST.]

DENTISTS FOR MUSEUM TO DR. EVANS' MEMORY.—The Central Dental Association of Newark, N. J., went on record as favoring the establishment of an institution in America to be known as the Evans Dental Museum and Institute. Under the will of Dr. Thomas W. Evans of Paris a fund of $1,500,000 was created for the use of American dentists to make original researches and investigations along dental lines.

TREATMENT OF TUBERCULOUS SINUSES BY BISMUTH PASTE.—Dr. Emil G. Beck, Chicago, said that in the ten cases presented before the Chicago Medical Society, January 15, the fistulas have remained closed, and the two which at that time had a slight discharge have since closed. A longer series of cases treated since, with equally good results, has taught him some new points. First, the bismuth paste, if it is not discharged during the healing process, becomes encapsulated and finally absorbed. In cavities with rigid walls the bismuth plug becomes first organized by connective tissue, and after absorption of the bismuth fibrous tissue remains. When the walls of the abscess are resilient, such as the pleura, for instance, they will gradually collapse while the bismuth is undergoing absorption. This can be proved, first, by the taking of radiographs at certain periods; second, by physical examination of the patient; third, by microscopic examination of tissues. Bismuth subnitrate, although considered an insoluble substance, has been proved to be absorbed, when taken internally, or injected into fresh wounds. It was found by many observers in the urine, blood and milk, as well as in the organs, thirty days after ingestion.

Having proved the absorption of bismuth, the practical question arises, is the absorption harmful? Little is heard of bismuth poisoning, although nearly every practitioner prescribes that drug, and radiographers administer as much as 40 grams of pure bismuth subnitrate in one bismuth meal, to obtain radiographs of the digestive tract, and none has observed any ill effects from it. A few authentic cases of bismuth poisoning found in literature have put the author on his guard, but in about 2,000 injections he has not yet met with any symptoms of poisoning. Guinea pigs were injected with one-twentieth of their body weight of bismuth paste, exhibiting no symptoms of poisoning. Arsenic-free bismuth may be considered harmless, but it is safer not to use more than 100 grams of the 33 per cent bismuth-vaselin paste in the first injection.

The bactericidal value of bismuth subnitrate has been underestimated. The author has determined that its presence in the living tissues invariably causes the gradual diminution, and often a complete extermination, of microorganisms in the secretions. The *Bacillus tuberculosis* shares the same fate. The discharge from the fistula likewise changes from a purulent or seropurulent to the serous. The method is contraindicated wherever the plug may obstruct the secretion from vital organs, or in the cranial cavity, where pressure on the brain may cause serious damage. There is a promising field in the sinuses of the head. Five cases of resist-

ing suppurative disease of the antrum of Highmore have been cured by Dr. Joseph C. Beck by this method.

The most important advance made since January 15 is the prevention of tuberculous sinuses. The method is as follows: A cold abscess following tuberculous disease should, under the most aseptic measures, be opened by an incision about one-quarter of an inch long, the pus evacuated, and the cavity refilled at once with half the quantity of a 10 per cent bismuth-vaselin paste, and the opening not sealed. A sterile gauze dressing is placed over the incision and a five-yard sterile gauze bandage is snugly put on and securely pinned, so that the patient, usually a child, cannot displace and infect it. Fresh dressings are to be applied daily under aseptic precautions. Should the opening close and fluid reaccumulate, it should be reopened; the fluid, which is then more serous, squeezed out, but the cavity need not be refilled, as it will usually remain collapsed. Three cases so far treated in this way have demonstrated the practical value of the prophylactic method by bismuth paste injection.—*Jour. Amer. Med. Assn.*

[This is worthy of investigation from the dental aspect, as it might prove highly efficacious in the treatment of chronic dento-alveolar abscesses where much absorption has taken place in the apical area.—Editor DIGEST.]

PROTECTION OF PULPS UNDER GOLD INLAYS.—I shall endeavor to suggest a simple system to overcome these embarrassing cases. This method has been suggested to others, and they report uniform success. It is practical in porcelain or gold inlays; in vital or devitalized teeth. However, I shall dwell upon the Taggart cast gold inlay in vital teeth. I have used it for the past eight months successfully. In all deep cavities, where cast gold inlay is practical, use it. Prepare the cavity in the usual way except to bevel angle of enamel surfaces outward to give outer edge of inlay a more firm seating, independent of cement, as explained more fully later. Now fill the cavity to about one-sixteenth of an inch from the line of the enamel and dentin with guttapercha (temporary stopping) or dental-lac; my preference is the stopping, as the surfaces can be etched, making a roughened surface on the cement side for a more firm adherence; trim the guttapercha smooth at the edges, take usual wax impression over the guttapercha, cast the inlay, then entirely remove the percha, fill cavity with cement, place inlay and drive home and remove excess as usual.

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Fourth—The filling has a far better adaptation than a large mass.—W. G. HAMM, *Items of Interest.*

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VOL. XIV. DECEMBER, 1908. No. 12

The Dental Digest

A MONTHLY SUMMARY OF DENTAL SCIENCE DEVOTED TO THE PROGRESS OF DENTISTRY.

EDITED BY

JOHN P. BUCKLEY, Ph. G., D. D. S., Chicago, Ill.

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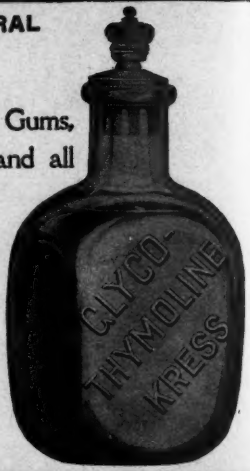

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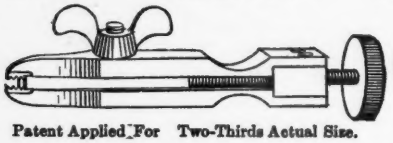

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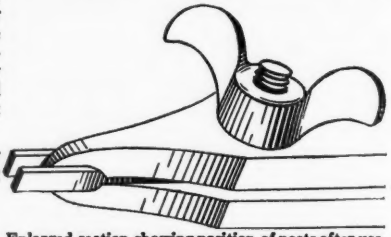

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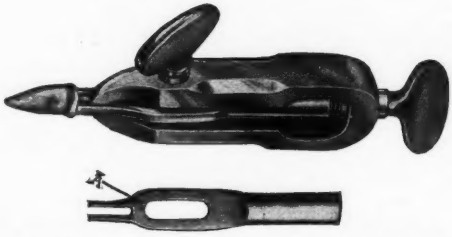

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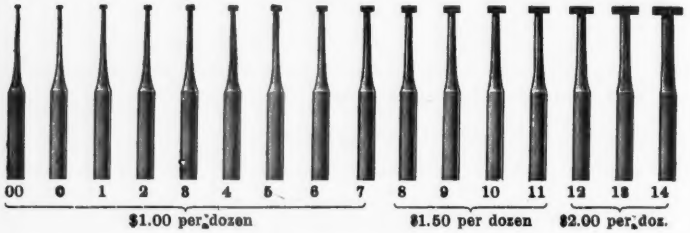
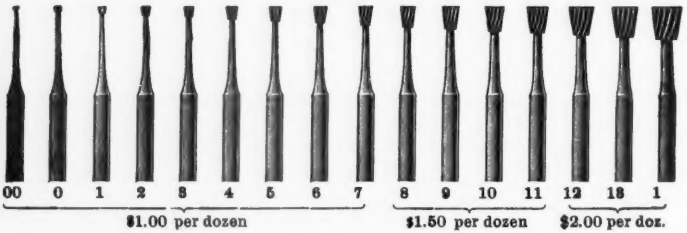
ROUND

WHEEL



INVERTED CONE



(When formulating your order be sure to specify for what style handpiece burs are required. See page 9.)

Fellowship Burs

PEAR

SQUARE-END FISSURE

POINTED-END FISSURE

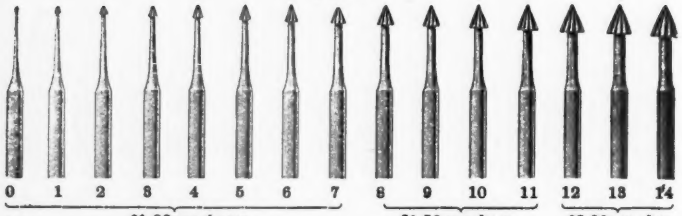
OVAL

(When formulating your order be sure to specify for what style handpiece burs are required. See page 9.)

Please mention the DENTAL DIGEST when writing to advertisers.

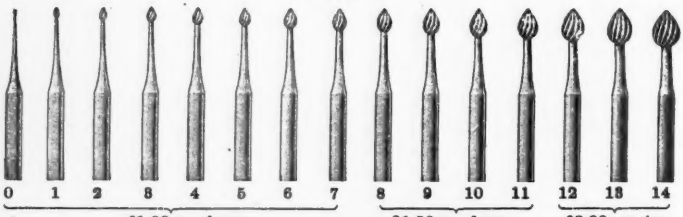
Fellowship Burs

CONE



$1.00 per dozen — $1.50 per dozen — $2.00 per doz.

BUD



$1.00 per dozen — $1.50 per dozen — $2.00 per doz

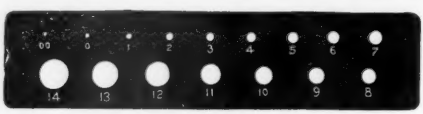
For Universal Straight Handpiece

For Nos. 1 and 3
Right Angle Attachments

For No. 2
Right Angle Attachment

For Davis Angular Handpiece

Fo Fellowship Angular Handpiece

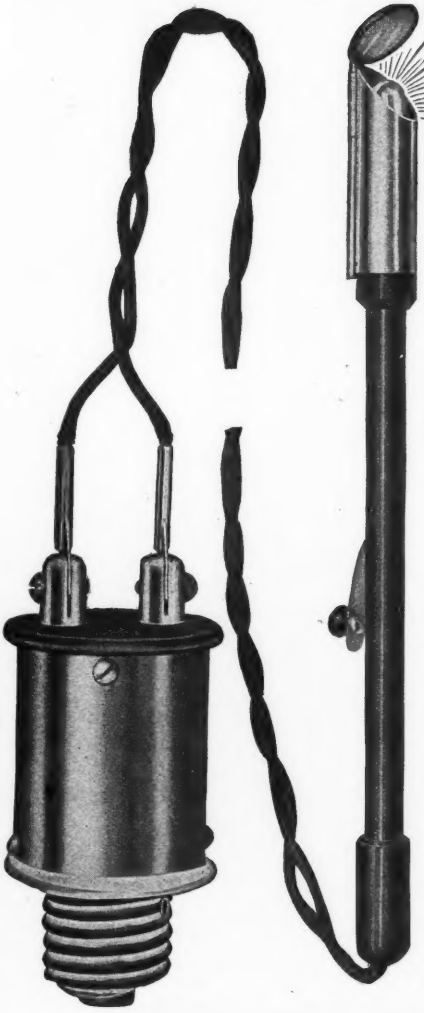


BUR GAUGE

This imprint is shown for the reason that many will find in it an easier way of recognizing the exact sizes of burs required. All sizes shown on the gauge may be obtained in every pattern illustrated with the exceptions of the Pear, Cone and Bud. In these three latter no size smaller than No. 0 is made.

Dental Protective Supply Co.

Chicago **Philadelphia**



YOU NEED

an Electric Mouth Lamp for those dark cavities. We know scores of dentists who bless the day they invested in this outfit.

The D. P. S. Co.'s Electric Mouth Lamp

is simple in construction, neat and compact in design, and withal answers every purpose for which it is intended.

The plug, which admits of using the lamp on any electric-light fixture, also embodies the resistance. The lamp holder is of hard rubber and has midway of its length a small finger contact by which current is thrown on or off. The incandescent lamp, which can be readily replaced when burned out, is enclosed by a metal shield to which is attached an adjustable mirror. All metal parts are nickel-plated and the outfit is supplied with 5 feet silk conducting cord and for attachment to either Edison, Thompson-Houston or Westinghouse sockets. Can be furnished for 104-volt alternating, 110-volt direct currents or for 4 volts for use with batteries.

When ordering please give full particulars as to style socket, also voltage, etc.

PRICE, COMPLETE, $5.00

Price Complete (no socket needed) for use with batteries, $2.50

Dental Protective Supply Co.

CHICAGO **PHILADELPHIA**

SUCCESS

can only be measured by results. The results to be desired where cements are used can **only be obtained with**

FELLOWSHIP

It is the one cement equally valuable whether used as a permanent filling, for the setting of crowns and bridges, or porcelain inlays. In addition to these uses many leading porcelain workers keep it constantly at the chair side as an impression material for inlay cavities. Its density, hardness and entire lack of contraction and expansion make it peculiarly adaptable in all these places.

QUALITY, THE HIGHEST, AND ALWAYS UNIFORM, insuring
RESULTS WHICH ARE ABSOLUTELY DEPENDABLE.

Price per Box, $1.00

Colors: White, Light Yellow, Yellow, Light Pearl Gray, Pearl Gray, Blue Gray.

Manufactured only by

Dental Protective Supply Company,

1303-6 Heyworth Bldg., 34 Madison St.,
CHICAGO.

Branch, 818 Real Estate Bldg., PHILADELPHIA.

Sold by All Reputable Dealers.

1897 — 1907

A DECADE

of tests by use throughout the civilized world has only served to more firmly establish

Fellowship Alloy

in its position at the top of the list. Despite competition in its own field and many innovations in the way of filling materials and methods it is in ever increasing demand wherever dental material is sold.

It was formulated to provide the dentist with a really reliable and trustworthy metallic plastic filling. In this it has fulfilled the object of its genesis and is or should be the standby in every dental office.

Fellowship Alloy is always **Uniform**
Demand proclaims it **The Best**
In the long run **The Cheapest**

PRICES

1 ounce, - $2.50 5 ounces - $10.00

Subject to usual discounts for cash.

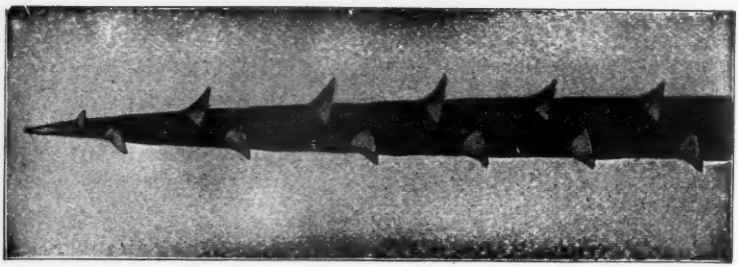
Manufactured solely by the

DENTAL PROTECTIVE SUPPLY CO

CHICAGO — PHILADELPHIA

A Pointed Question

ARE YOU USING FELLOWSHIP BROACHES?



If not, you will find here appended a few reasons why you should:

First—Being made in our own factory they represent Fellowship quality and are therefore the best.

Second—They are made of a specially selected material in the hands of expert workmen.

Third—Well barbed in four distinct rows, every barb retaining its edge and strength indefinitely.

Fourth—Tempered by a special process, they are rendered tough and elastic but without being in the least brittle.

Fifth—Every broach is tested before leaving the factory.

Sixth—They were the first offered the profession at a reasonable figure.

We manufacture in four different sizes, and put them up in packages of six, containing either extra-fine, fine, medium, coarse or assorted.

Price, per dozen $1.00
" " half gross 5.50

Dental Protective Supply Company

1303-6 Heyworth Building, 34 Madison St., Chicago
818 Real Estate Bldg., Philadelphia

FELLOWSHIP
TWIST BROACHES

We have found these broaches to be steadily growing in favor, many practitioners preferring not to use those of the barbed variety. They are made of a particularly tough and yet pliable steel, which allows of being twisted into a spiral form, thus giving a broach which is easily introduced into pulp canals by a rotary motion. By our method of tempering they are practically unbreakable. Another distinct advantage in their use is the fact that they can be used in much smaller canals than is possible with those which are barbed. They are put up in fine, medium, coarse and assorted packages containing one-half dozen.

PRICES:

Per dozen, for use with any style holder, $ 1.00
Per half gross, " " " 5.50

Also supplied in a short length with thumb hold, for use on molar teeth; per doz., $1.50.

Plain Broaches

These are made of the same material as our other styles of broaches, and are largely used for introducing cotton pellets with medicaments into root canals. We can supply in three styles, plain, roughened, or with hook.

PRICE:

Per dozen, any style, - 75 cts.

MANUFACTURED BY

Dental Protective Supply Company

1303-6 Heyworth Bldg., 34 Madison St., CHICAGO

Branch, 818 Real Estate Bldg., PHILADELPHIA

Impression Trays for Full Cases

These trays are made of heavy aluminum plate, and the handles extend well under the sides and are attached by means of three rivets, thus affording trays with almost as much rigidity as those of Britannia metal. It is conceded that aluminum trays are more cleanly and more adaptable, which facts, added to their extreme lightness, make them particularly desirable. Those trays illustrated above are for full cases, either upper or lower.

PRICE, EACH 25 CENTS

Dental Protective Supply Company

CHICAGO **PHILADELPHIA**

Impression Trays for Partial Cases

These trays differ only from those shown for full cases in that they are for partial dentures. Nos. 7 and 8 are designed for impressions for anterior bridges. Nos. 9 and 10 for either right or left, and upper or lower partial cases. No. 11 is intended for use where lower anterior teeth remain in the mouth. No. 12 is designed for wax bite plate.

PRICE, EACH 25 CENTS

Dental Protective Supply Company

CHICAGO **PHILADELPHIA**

MALLETING

by hand has lost much of its vogue in recent years. This act may be largely attributed to the perfection now reached in the manufacture of mechanical mallets, notably those known as "automatic."

By the use of such an appliance a marked saving of time is effected without lowering in any sense the standard of the work done.

IN THE

Fellowship Automatic Mallet

we draw attention to an appliance which we consider second to none. The construction is simplicity itself. the direct and pull strokes being governed by the same mechanism. All the working parts are carried by the spindle, which reduces the friction. All those parts subject to wear are made of hardened steel. The workmanship throughout is the very best. The mallet gives a uniformly dead blow, the force of which may be varied to suit the needs or wishes of the operator. The adjustment to regulate this is made by turning a knurled thimble at one end.

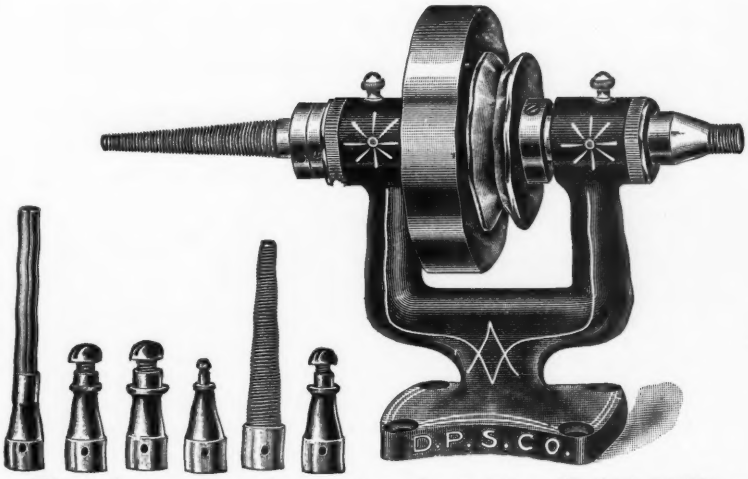
Both ends are drilled to hold either the cone socket or automatic plugger points. The "grip" on either end is covered with black hard rubber.

PRICE, $6.00

Dental Protective Supply Co.

CHICAGO PHILADELPHIA

THE FELLOWSHIP
LATHE HEAD AND CHUCKS



This lathe is made on the cone journal principle. ***IT HAS DUST-PROOF CONE BEARINGS and the CHUCKS ARE SELF-TRUING***

The spindle bearing on right side is fixed, while that on the left is movable, so that any wear may be taken up readily. There is a jamb nut to tighten the movable cone when adjustment has been made and to prevent its working loose.

The dust-proof caps prevent grit from working into the bearings and destroying them.

All chucks are self-truing. The hole in each is conical, so that when screwed onto the spindle shaft the chuck seats itself over a corresponding taper, and is thus held in perfect alignment with spindle.

All polished parts are nickel-plated, while the balance is japanned.

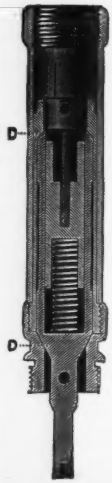
Price, complete, with six chucks, $7.00

Manufactured by

DENTAL PROTECTIVE SUPPLY COMPANY

1303-6 Heyworth Bldg., 34 Madison St., Chicago
818 Real Estate Bldg., Philadelphia.

THE FELLOWSHIP
Slip-Joint Connection



The sectional illustration shows the perfect mechanism of this attachment and will prove our claim to having the simplest appliance of its kind.

Unlike the majority of Slip-Joint Connections, the wear in the Fellowship can be taken up by means of the cone bearings at D-D, a feature which absolutely guarantees that this appliance will outwear any other. The double bearings also insure perfect and true running, thus obviating any possibility of the bur wobbling.

All parts are so threaded as to admit of its application to any handpiece, thus making it distinctly universal.

A glance at slip sheath A will show how simple the locking device is and will also furnish another proof of the simplicity of design and mechanism, as there is no awkward spring or lever to obstruct its ready use. In other words it is, as such an appliance should be, a true slip-joint connection.

PRICES: **Complete, Parts A, B, C, $5.00; Extra Sheath, A, 75 cents; Extra Dog, C, 25 cents.**

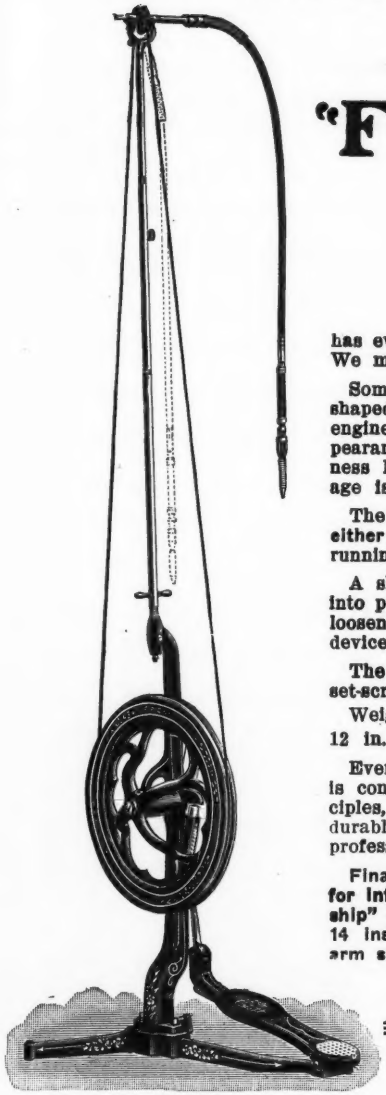
Dental Protective Supply Company

1303-6 Heyworth Building, 34 Madison St. CHICAGO

Branch: 818 Real Estate Building, Philadelphia

IT IS CONCEDED THAT THE

"Fellowship" Engine



Pat. Oct. 12, 1895.

has every engine virtue and no engine faults. We make it so.

Some recent improvements, such as the dish-shaped wheel, rigid pitman, etc., make this engine the most artistic and attractive in appearance of any. All points of possible weakness have been strengthened, so that breakage is almost impossible.

The drop pulley-head has long bearings on either side of the wheel, which insure steady running and equal wear at all points.

A slight upward toss of the arm raises it into position and pressure on the thumb-piece loosens. This is the most convenient locking device on the market.

The standard can be raised or lowered by set-screw.

Weight of driving wheel, 13 lbs., diameter 12 in.

Every feature of the "Fellowship" engine is constructed upon correct mechanical principles, and it is the easiest running and most durable article of the kind yet offered to the profession.

Finally, the price is lower than that asked for inferior engines. We offer the "Fellowship" equipped with our universal handpiece, 14 instruments, oil can, flexible sleeve and arm support for

$30.00

DENTAL PROTECTIVE SUPPLY CO.

1303-6 Heyworth Bldg., 34 Madison St., - - CHICAGO

Branch, 818 Real Estate Building, Philadelphia

Teeth Reflections

are a most necessary accompaniment of the dentist's profession! Hence the need of a good mirror.

Our dental mirrors are unexcelled. The glasses for the lenses are carefully selected and the latter are mounted in heavy german-silver frames, being made as near aseptic as possible. The handles are reinforced where they screw into the sockets by means of threaded metal rods, thus entirely obviating any risk of breakage. Supplied with either plain or magnifying glasses and black or white handles.

Sizes as follows:

No. 1, $\frac{9}{16}$ in.	No. 2, $\frac{11}{16}$ in.	No. 3, $\frac{3}{4}$ in.
No. 4, $\frac{7}{8}$ in.	No. 5, 1 in.	No. 6, $1\frac{1}{16}$ in.

PRICES:

With handle, each - - -	$ .65
Without handle - - - -	.50

Dental Protective Supply Company

1303-6, Heyworth Bldg., 34 Madison St., Chicago
818 Real Estate Bldg., Philadelphia

NEW PROCESS
FELLOWSHIP CEMENT

PATENTS PENDING

POSSESSES EVERY DESIRABLE CHARACTERISTIC

Chiet Among Them Are:

Its easy mixing quality and extreme plasticity.
It is very sticky and, therefore, extra adhesive.
If disturbed while setting will not become brittle.
Possesses cohesiveness in such degree as cannot be approached.
It is submarine, thereby lessening operator's time and trouble.
Is somewhat slower setting than original "Fellowship."
Is compatible with tooth structure, therefore protective.
Is absolutely non-shrinkable.
Is dense and impervious to mouth secretions if properly mixed.
Makes an excellent permanent filling.

Sold in eight shades: *White, Yellow, Light Yellow, Grey, Pearl Grey, Light Pearl Grey, Blue Grey and Brown*

PRICES

ONE COLOR PACKAGE, 1 liquid, 1 powder, - -	$1.50
FOUR COLOR PACKAGE, 2 liquids, 4 powders, - -	4.00
(Shades in 4 color package are White, Light Yellow, Pearl Grey and Light Pearl Grey)	
EXTRA POWDER OR LIQUID, each. - - - -	.75

Manufactured Solely by the

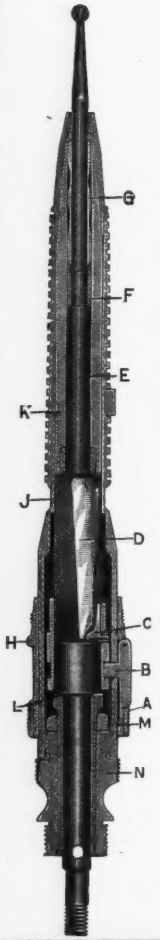
DENTAL PROTECTIVE SUPPLY CO.

CHICAGO PHILADELPHIA

THE

Fellowship Handpiece

IS GUARANTEED



At any time during one year from date of original purchase we agree to repair or replace any defective part without charge to the purchaser. This should be ample proof of our faith in the efficiency and perfect workmanship of this very necessary appliance.

The Fellowship Handpiece is simple in construction, easy of manipulation, cleanly, has well-balanced end bearings, is true-running and long-wearing.

Price, $7.00

Manufactured and for sale by the

Dental Protective Supply Co.

CHICAGO PHILADELPHIA

Just What You Want

BEST BY TEST

THIS IS $1.00 FOR YOU. CUT OUT this ad and send it to us with $1.00 and we will send you prepaid any two of our preparations you select (once), as a trial will convince you of their superiority. **Send to-day if you want the best.** References, People's Bank of Brooklyn and any dental depot in N.Y. State. Guaranteed by your dealer; the manufacturer is back of him.

When every Dentist who tries it **says so, it must be so**
(That's the best proof)

That Dr. Gilmore's Excel Aseptic Anæsthetic

is the **best** on the market. **No matter what anæsthetic you now buy, try Dr. Gilmore's Excel; you will say it is best and continue to use it,** as others have. **Price,** 2-oz., $1.50; 6-oz., $3.60; 10-oz., $5.00.

We give formulas with all of our preparations

ABCESQUE cures all abscesses and is a fine root-canal filling. **PULPINE** saves pulps, stops hemorrhages and after-pains. **EXCEL DEVITALIZING PASTE** devitalizes painlessly. **LOCALINE** is a local anæsthetic applied to the gums (on cotton). All these are $1.00 each. **Sold by dealers everywhere. Manufactured by**

EXCEL CHEMICAL COMPANY

2228 Fulton Street **BROOKLYN, N. Y.**

THIN • FLEXIBLE

TOUGH • DURABLE

RAPID • CUTTING

SAFE • SIDED

Hall's Carborundum Rubber Disks

USE • WET OR DRY

WILL NOT • BREAK

For all purposes from finishing Fillings to shaping Crowns and Inlays.

Ask Your Dealer for Them.

WM. R. HALL & SON

115 N. 17th St.
PHILADELPHIA, PA.

THREE • GRITS

FOUR • SIZES

40 CTS. • PER DOZEN

BETTER • TRY THEM

Send this "ad" with 10 cts. for samples and booklet of our specialties.

The Standard of Quality

We devote our entire attention to the manufacture of **Gold Fillings.** We make nothing else.

Fine Gold Foil
Pure Gold Cylinders
Pure Gold Ropes
} ⅛ oz. $3.50; 1 oz. $27.00

Extra Pliable Burnish Gold Cylinders
$\frac{1}{16}$ oz. $2.25; 1 oz. $34.00

"M & H" Mat Gold
A NEW AND IMPROVED PRODUCT
This is a well tested form of fibre or sponge gold which cannot be surpassed. We respectfully solicit a trial order.
1-16 oz., $2.15; ⅛ oz., $4.25; ¼ oz., $16.00; 1 oz., $32.00.

Order direct, if not obtainable from your dealer.

Morgan, Hastings & Co.

817-821 Filbert St. PHILADELPHIA, PA.

THE MEDICO-CHIRURGICAL COLLEGE
OF PHILADELPHIA

DEPARTMENT OF DENTISTRY

As a distinct part of the Medico-Chirurgical College the Department of Dentistry offers superior advantages to its students. The clinics of the college present wide opportunities for the practical study of general and oral surgery, as well as supplying abundance of material for practical work in the Dental Infirmary. All of the privileges of the students of the Medical Department of the College are accorded to Dental students. A complete system of quizzing conducted by the professors free of charge, obviates the expense of private quizzing and prepares the students for examination. Illustrated catalogue describing courses in full and containing all information as to fees, etc., sent on request to

I. N. BROOMELL, D.D.S., Dean, 17th and Cherry Sts., Phila., Pa.

Watt's Metal or Fusible Alloy

A large number of successful dentists are to-day using Watt's Metal for their plate work, and this class of denture is growing in favor with both profession and public.

Plates so made are strong, cleanly, and especially adapted to lower cases where weight is a necessary feature. It is further claimed that a better fit may be obtained than with either rubber or celluloid, and after years of use and exposure to the mouth secretions the denture shows no change in either structure or color. Plates may be made entirely of the metal or on the combination principle of Watt's Metal base and either rubber or celluloid attachment.

Another advantage is that by its use the practitioner is enabled to obtain a considerably higher price for a denture than is possible where rubber or celluloid only is used.

Price, Per Ingot, $1.00

MANUFACTURED AND FOR SALE BY

Dental Protective Supply Company

CHICAGO - - - PHILADELPHIA

CLARK SPITTOONS

EVERY MAN
THAT USES ONE
IS A BOOSTER

Single Bowl - -	$40.00
Double Bowl - - -	65.00
Reservoir - -	40.00

A book that tells the truth about spittoons for the asking.

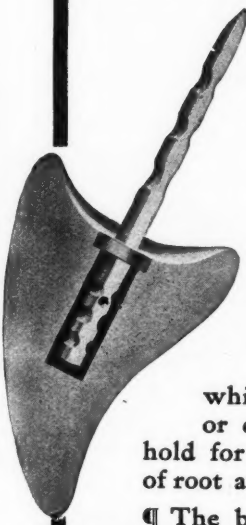
A. C. CLARK & CO.

1250-1268 E. 76th St.

CHICAGO.

The

DAVIS CROWN



Maintains its superiority over all other crowns because of the following distinct features:

¶ The detached pin permits exact grinding and facilitates accurate fitting. It offers no interference as found in the fixed pin crown. It requires the minimum amount of reaming of the root.

¶ The general conformation of the pin is round with flattened face, which prevents its turning in the root or crown. The grooves afford a firm hold for the cement, insuring a strong union of root and crown.

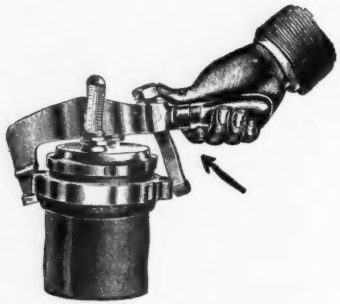
¶ The broad shoulder of the pin fits into a countersunk rim in the crown, and, acting like a keystone, guarantees rigid and permanent setting.

¶ The variety of molds affords a great selection.

¶ The adaptability of the Davis Crown allows a wide application and it has proved especially valuable in bridge work. In case of repairs or replacement, the patient is spared much distress, as the pin need not be removed from the root.

¶ The Davis Crown is made of the famous Consolidated Porcelain and possesses that greatest adornment—

that Live Tooth Appearance



Is Your Vulcanizer as Easily Operated as This?

To open the "LEWIS" slack off the nut, tilt the bolt, lift the bar, remove the cap and the pot is clear of all obstructions. To close it, reverse the procedure. Can you imagine anything less complicated and less likely to cause trouble?

"The best machinery is but the employment of simple things utilized to their fullest extent," says a writer discussing the tendency to complication in dental appliances. The "LEWIS" is built up of "simple things" and the more than 24,000 in daily use demonstrate its proper classification as "best." It costs but $16.00, $18.00 or $20.00 according to size, at your dealer's. We want to tell you the whole story of Vulcanizers and send catalog "C."

Buffalo Dental Manufacturing Co.

Buffalo, N. Y., U. S. A.

Absolute Dryness Preserved

With Cotton Dental Rolls

"It is not necessary to apply the dam for the proper introduction of plastic fillings and for other comparatively short operations."

This plain truth is proven daily by thousands of skillful and conscientious dentists, and may be proven to one's own satisfaction by trial.

With Cotton Dental Rolls, that it takes but a single moment to apply, equally good results are obtained, the time taken to apply the dam is saved, and the accompanying annoyance to the operator and discomfort to the patient are avoided.

If you are not familiar with them and do not understand their use write for samples free of charge and the leaflet telling how to use them, which also contains suggestions for their application from a number of prominent dentists.

Sold by leading Dealers in Dental Supplies in every country in the world.

JOHNSON & JOHNSON

Specify Johnson & Johnson's

New Brunswick, N. J., U. S. A.

DR. DAVIS' NEW COMBINATION SEPARATOR AND MATRIX

PAT. MAY 9th, '05

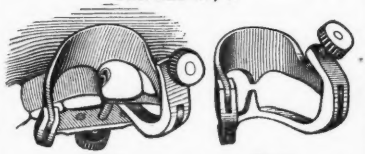


Fig. 1 Fig. 2

The great advantage of this appliance is that it excels in being complete either as a Separator or Matrix for the front teeth. In combination it is used as a Matrix and yet furnishes an excellent Separator when used alone. It gives two instruments in one. By turning set screw in arm separates the teeth so that the filling can be built full; by tightening screw in bar forces the steel band against the lingual surface, which makes a floor that is strong enough to resist the blow and pressure that is necessary in condensing gold fillings, which allows the contouring of the lingual as well as the labial surface of the filling. It saves time and labor for the Dentist. Fig. 1 shows it properly adjusted for a filling. Fig. 2 shows the bar removed when used only as a Separator. Price $3.50 with 1 doz. bands. Extra bands 25 cents per doz. For sale by your dealer or direct.

DR. F. DAVIS, Moulton, Iowa.

PLATINUM

IN ANY FORM BOUGHT OR SOLD

CROSELMIRE & ACKOR CO.

MAIN OFFICE AND FACTORY: **42 WALNUT ST., NEWARK, N. J.**

N. Y. Office, 10 E. 23d St. Chicago Office, 1209 Stock Exchange Bldg.

Prepared Especially for

DENTISTS' USE

The greatest cleanser and purifier known for the skin. It instantly removes all impure and injurious substances from the hands pertaining to laboratory occupation, keeping the skin soft and white under all conditions.

Safrol Cream is prepared from pure medicinal oils and made entirely by hand.

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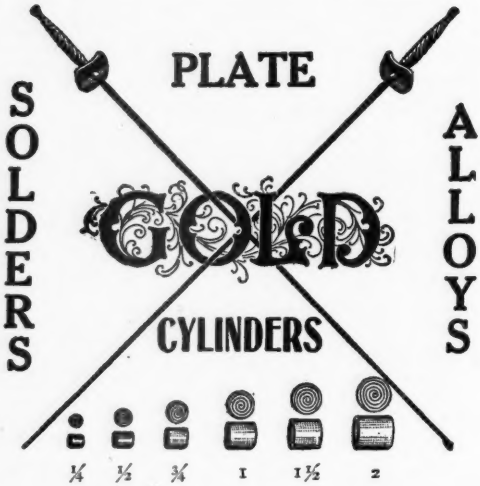

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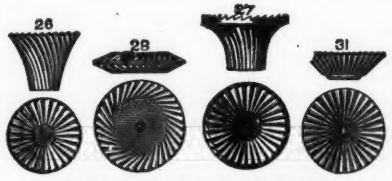

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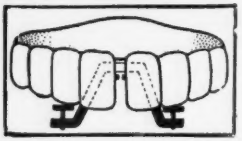

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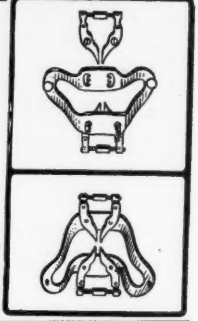

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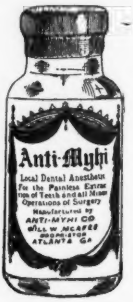

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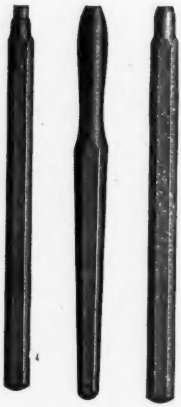

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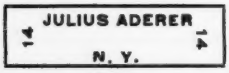

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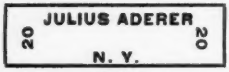

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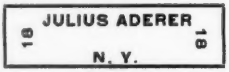

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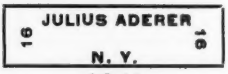

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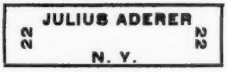

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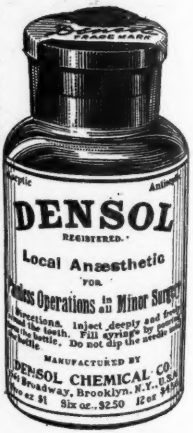

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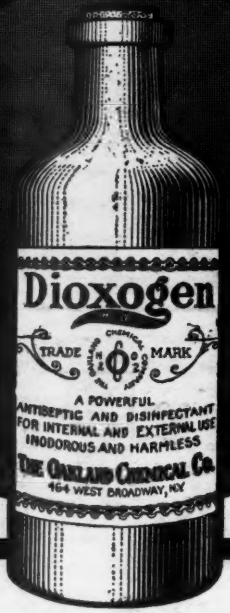

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